

PLANTS OF GOOSEBERRY HILL

by MICHAEL BROOKER

CSIRO Sustainable Ecosystems, Wembley, Western Australia 6913

and PENNY HUSSEY

Department of Conservation and Land Management, Como, Western Australia

This paper is dedicated to Joanna Seabrook for her long-standing and tireless contribution toward the conservation of native plants in the Helena Valley and elsewhere in Western Australia.

INTRODUCTION

Vegetation studies on Gooseberry Hill were begun in 1983 and some of the results have been published in Brooker (1998). The aim of these early studies was, primarily, to measure structural features of the vegetation and the distribution of tree and shrub species - information that could be related to the biology of the bird species under study and the effects of wildfire on them. A reference collection was prepared, built on the pioneering work of Joanna Seabrook in the Helena Valley. In addition, the staff at the WA Herbarium and a number of local botanists helped with identification of plants in the collection, in particular Gwen Abbott, Lyn Atkins, John Marshall and Philip Reynolds.

Following the hot summer fire of 1994 (Table 1), the authors undertook censuses to measure the distribution of all vascular plants across the study area. Apart from sheer curiosity, the aim of this census was to obtain a spatial measure of plant species richness that can be measured only after fire. For

example, three of the most frequently recorded native species (*Austrostipa macalpinei*, *Actinotus leucocephalus*, *Trachymene coerulea*) were rare on Gooseberry Hill except immediately after fire. Post-fire census data is therefore suitable for relating to topographic and disturbance parameters. Here we present a list of native species found on Gooseberry Hill and examine the effects of some environmental factors on the distribution of the more common species. An historic listing of plants found in the area of the Knoll is given in Hussey (1995) and introduced species found on the southern slopes of the western end of Helena Valley are listed by Hussey (1993). A more detailed examination of the occurrence of weed species is in preparation.

Since 1984, one author (PH) has kept detailed records of flowering period. Plant identification in this case was done with reference to Marchant *et al.* (1987) and checked for currency using the Western Australian Herbarium's Reference Collection and FloraBase. Voucher specimens have been lodged in the Western Australian Herbarium.

METHODS

CENSUS

Prior to censusing, transect lines were established between the 100 m grid markers. On all east-west and some north-south lines, 1106 census sites were permanently marked with a ribboned peg at 10 m intervals. On four occasions in 1994 (August, September, October and December) species present within 1 m of each peg were recorded.

From October to December 1995, the sites were revisited to record the presence of seeder trees and shrubs and to check anomalies from the 1994 census. All sites were visited once again in spring 1996 to census dodders which had not previously been identified to species level. Some early-flowering species that failed to persist until August could have missed - the only species we knew to have been overlooked in this way was the White Bunny Orchid *Eriochilus dilatatus*. Similarly, the occurrence of some species such as wurmbeas could have been underestimated, as would species with short periods of detectability such as *Pterostylis*. Lomandras were heavily and selectively grazed by kangaroos after fire, so their presence on some sites may have been overlooked.

Where there was doubt about the identification of a plant, a specimen was collected so that it could be checked against the reference or by experts at the WA Herbarium. Even so, not all records could be positively ascribed to species. These included danthonias and some stipas. A collection of questionable *Lepidosperma* was identified to species level by Karen Wilson. This collection was used for field identification in the absence of a key for this genus.

Plants confined mainly to the north-south oriented gullies could have been under-represented on the east-west transects used, particularly *Chorizandra multiarticulata* and *Viminaria juncea*. *Grevillea manglesioides* was numerous on the river side of the area, generally north of the most northerly transect.

A number of site variables was measured. Aspect, altitude and gradient (Figure 61a,b,c) were obtained from an orthophotomap of the area provided by DOLA (see Figure 2). Soil classes (laterite, dolerite, granite) were based on the parent rock (Figure 63a,b,c). The

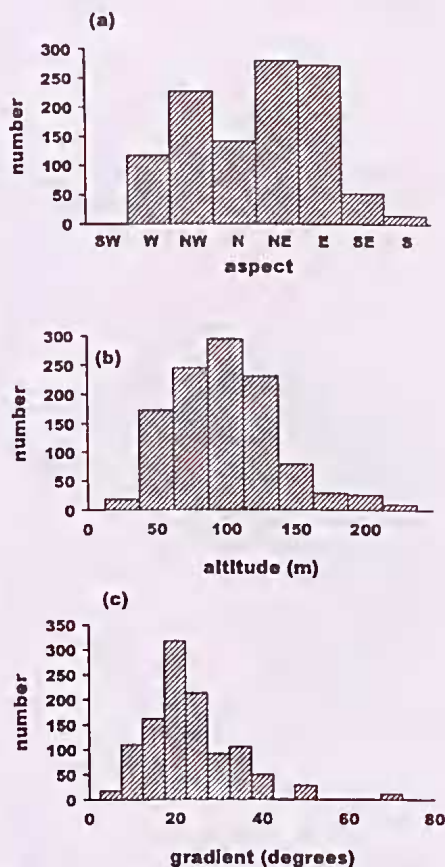


Figure 62. Distributions of (a) aspect, (b) altitude and (c) gradient on 1106 plant census sites

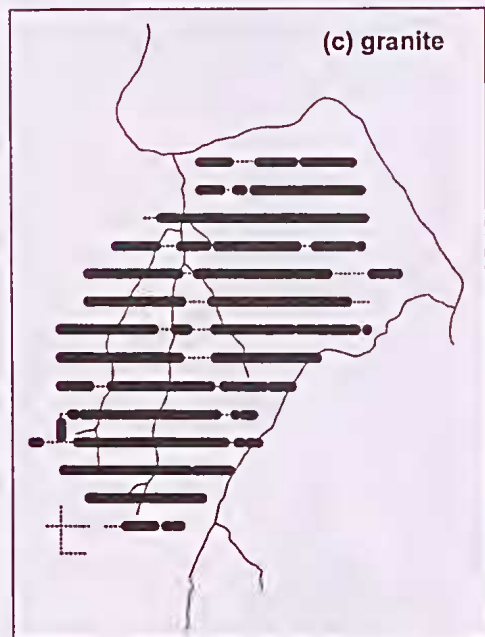
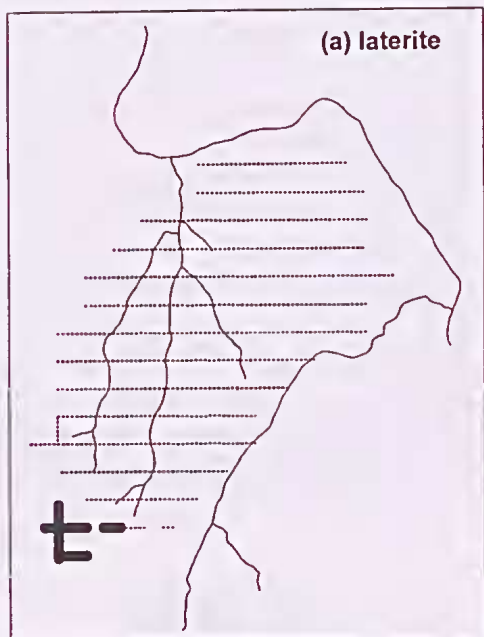


Figure 63. Distribution of soil types (a) laterite, (b) dolerite and (c) granite on Gooseberry Hill.

granite soil class included all types that were not lateritic or doleritic. It varied considerably in composition and depth. Fire history (Figure 64a,b,c) was obtained from maps of the burnt areas made immediately following each fire (see Brooker and Rowley 1991).

For common native species (found on 50 or more sites), relationships with some site variables were examined using generalised linear models (computer package GLIM; Baker and Nelder 1978). All involved multiple logistic regression, in which the error structure is assumed to be binomial and the data are logit transformed.

FLOWERINGCALENDAR

Flowering period on the lower to mid slopes of the study area was recorded more or less monthly from 1984 to 1987. During 1988 - 1990, monthly traverses were undertaken which covered a wider area. These led to a publication on the distribution of

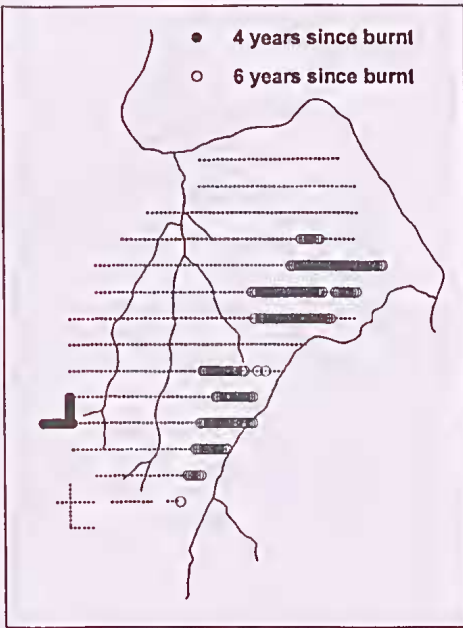


Figure 64. Fire history of Gooseberry Hill showing areas unburnt for (a) 4 and 6 years; (b) 7 years and (c) 9 years.

introduced plants (Hussey, 1993). Opportunistic recording has continued to the end of 1999. Thus, for most of the study area, detailed flowering records have been kept over a period of 11 years.

A species was recorded as flowering if, in a population, five or more plants had flowers/inflorescences, or an individual plant had 5 or more flowers/inflorescences. Fewer than this was not recorded. In the Appendix 4, two frequencies of flowering are noted. If the plants flowered in that month during the majority of the years in which they were recorded, eg in 8 or more years for common plants, this was given as the 'main' flowering period. Months in which some, but not all of the populations are in flower are listed as 'occasional'. Species which are less common, or those which flower most prolifically after a stochastic event such as fire, follow the same convention, but with fewer records on which to base the table.

RESULTS

CENSUS

A total of 491 plant species was recorded on Gooseberry Hill, of which 392 were natives and 99 introduced (Appendix 4). Overall, 80% of the species (393) were found on at least one of the 1106 census sites, as were 83% of the natives and 70% of the introduced species.

The number of sites on which each species was recorded ranged from 0 (18.9% of species) to 864 (0.2% of species), with a median of 11 sites per species (Figure 65).

The number of species per site varied from 0 to 55 (Figure 66) with a mean of 29.1 ± 7.8 and a median of 29.

Of the 393 species found on sites, 158 (40%) were recorded on laterite; 284 (72%) on dolerite; and 378 (96%) on granite. Thirty-five percent of species (139) were found on all three soil types.

Distribution maps and graphs for the common native species are given in Appendix 5. Of the 151 common species that occurred on 50 or more sites, 83 showed a significant difference in soil preference: 21 mostly preferred laterite; 19 preferred dolerite; and 43 preferred granite. Other less common species (on <50 sites) that occurred

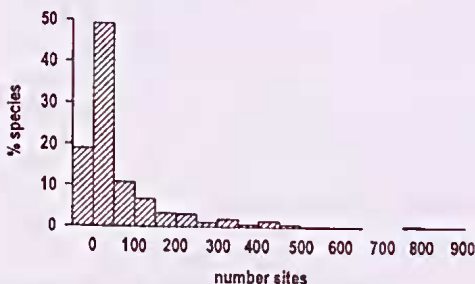


Figure 65. Frequency distribution of the number of sites each species was found on.

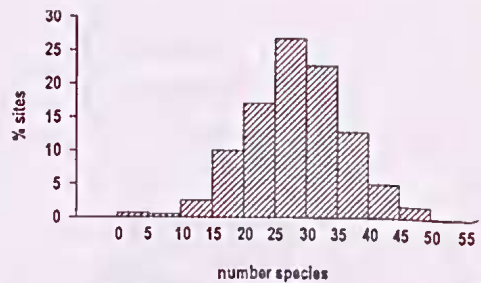


Figure 66. Frequency distribution of the number of plant species per site on Gooseberry Hill.

mostly frequently in laterite, included *Wurmbea tenella*, *Gahnia* aff. 'aristata', *Drosera leucoblasta*, *Scaevola calliptera*, *S. pilosa*, *Acacia nervosa*, *A. teretifolia*, *Calothamnus hirsutus*, *Eucalyptus marginata*, *Bossiaea ornata*, *Davesia cordata*, *Gompholobium preissii*, *Jacksonia restioides*, *Pultenaea ericifolia*, *Billardiera bicolor*, *Stylidium affine*. Two of the less common species (*Austrostipa elegantissima*, *Hakea myrtoides*) seemed to prefer dolerite.

Preference for aspect was determined by comparing west and north-west sites ($n = 344$) with all others; and east and north-east sites ($n = 553$) with all others. Seventeen species showed a significant preference for west-facing sites and 26 for east-facing sites (Appendix 4,5). There were insufficient south-facing sites for a north-south comparison.

With respect to gradient, a total of 22 species showed a significant preference

Table 8. The numbers of shrub species and non-shrub species (in parentheses) that showed a significant relationship with time since the previous fire.

Relationship	Resprouter	Seeder
positive	3 (7)	20 (6)
negative	13 (18)	1 (6)

for the steeper sites, while 25 species were found more often on flatter areas (Appendix 4,5).

It is interesting that for some species, their post-fire regeneration strategy was significantly related to time since fire (Table 8). Twenty-six of 33 obligate seeders had a positive relationship with time since the previous fire, while 31 of 41 resprouter species had a negative relationship (Appendix 4). There was a significant difference between seeders and resprouters in the proportions in each group (Table 8) ($\chi^2 = 21.5$, d.f. =

1, $P < 0.001$); and for an expected 1:1 ratio within seeder shrubs ($P < 0.0001$, Warwick 1932); all seeders ($P = 0.0006$); and resprouter shrubs ($P = 0.0105$); but not all resprouters ($P = 0.0601$).

FLOWERING CALENDAR

Flowering phenology is given for 476 plant species (Appendix 4), of which 96 (20.2%) are introduced. The Papilionaceae (42 taxa), Asteraceae (40), Poaceae (38), Orchidaceae (31),

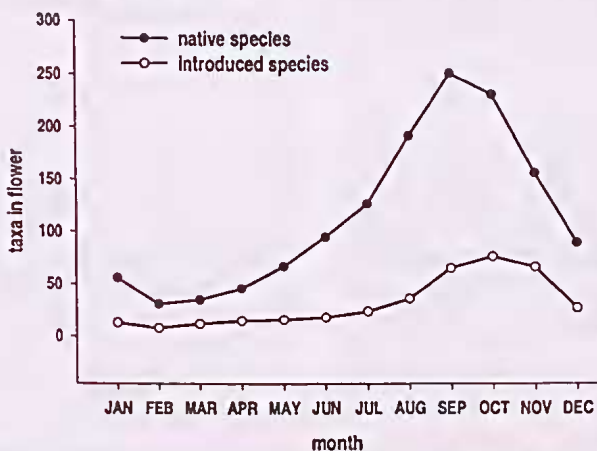


Figure 67. Number of native and introduced species flowering each month.

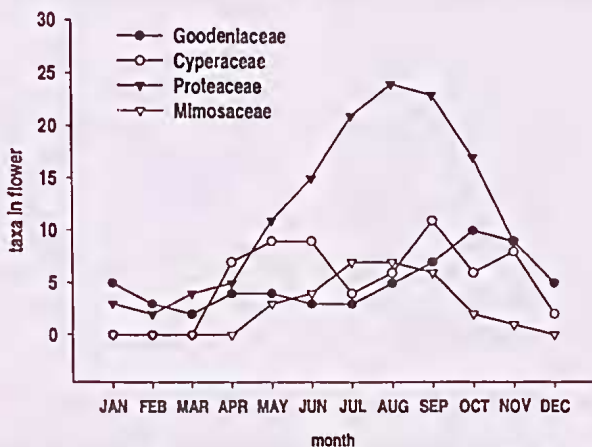


Figure 68. Number of species flowering each month in the Goodeniaceae, the Cyperaceae, the Proteaceae, and the Mimosaceae.

Proteaceae (29), Cyperaceae (23), Myrtaceae (23), Anthericaceae (19), Iridaceae (17), Apiaceae (14), Stylidiaceae (14), Droseraceae (11), Haemodoraceae (11), Goodeniaceae (10) and Mimosaceae (9) are the most species diverse families. Phenology was not recorded for 14 taxa known to be present, two being ferns, one a cycad, seven found only in or beside a small dam and four uncommon species.

The months in which flowering was observed are given in Appendix 4. Figures 67, 68 and 69 show the number of species recorded flowering each month.

DISCUSSION

A number of previous studies have reported on the plants of the Perth Hills area (Majer 1981, Worsley 1985, Armstrong & Muir 1994) or the Swan Coastal Plain (Milewski & Davidge 1980, Cranfield & Parker 1992). Of these, only Armstrong and Muir is directly comparable with this study. It was done in John Forrest National Park, some 10 km north, and 9 of its 22 sites lie on Churchward & McArthur's (1980) 'Darling Scarp' landform unit, within which the current study area lies. Armstrong & Muir reported on 587 species of plants over six years. Although this is a larger number of plants than the current study (491), it should be noted that they included sites in the 'Dwellingup' and 'Helena' units (Churchward & McArthur 1980). If elements of other units had been included in this paper (as was done in Hussey 1993) the total vascular plant species would be 609.

The long-term fire history of Gooseberry Hill has provided a unique opportunity to examine the effect of fire frequency on the occurrence of plant species.

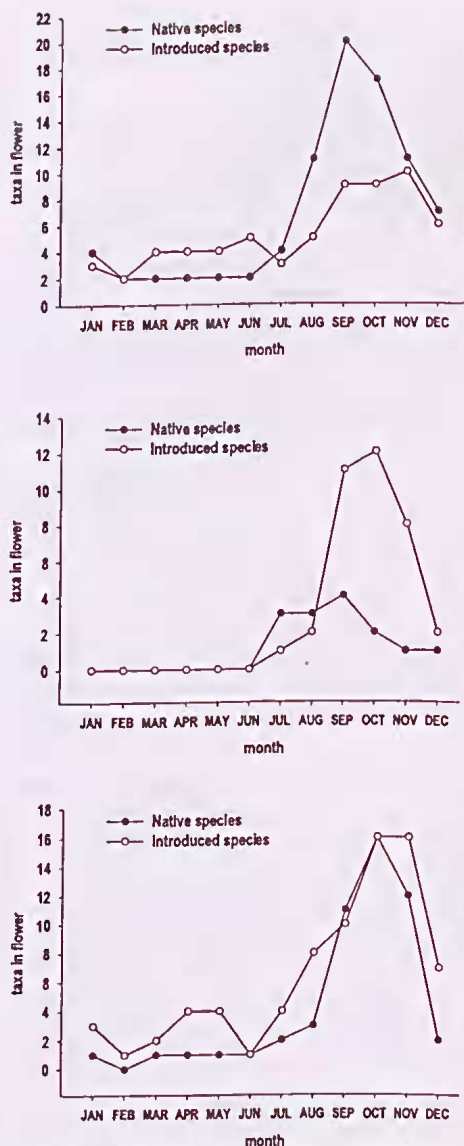


Figure 69. Number of species flowering each month in (a) Asteraceae, (b) Iridaceae and (c) Poaceae

One result of interest was the relationship where (a) seeders were more likely to be recorded the longer the time since the previous burn and (b) resprouters were more likely to be

recorded the shorter the time since the previous burn. Seeders may require time to build up a seed bank or, alternatively, may produce a larger seed bank, the longer the fire-free period. A similar explanation for resprouters is not so obvious, but could involve competition from seeders during long-unburnt periods.

The pattern of flowering produced by this study (Figure 67) is exactly similar to that given by Armstrong & Muir (1994), with a strong spring flush of growth, and introduced species peaking slightly later. This apparent homogeneity, however, hides considerable variation within and between families (Figure 68)

Mimosaceae and Proteaceae show the 'classic' pattern of a spring flush and summer quiescence. The flowering period presumably coincides with the maximum activity of pollinators, while seed production in spring-flowering plants will take place in late spring and summer, a peak period of activity for seed-collecting ants (Majer 1981)

Worsley (1985) shows a second, smaller peak in autumn/early winter and Armstrong & Muir (1994) hypothesise that this is an artifact of sampling. It is proposed here that such peaks could be produced by a preponderance of particular families. Cyperaceae has a pronounced peak in autumn - possibly this is an optimal period for wind pollination. Goodeniaceae peaks much later, and continues floristically active throughout the drier months. In late spring and early summer a number of blue-flowered members of this family come into bloom (*Goodenia caerulea*, *Scaevola glandulifera*, *S. pilosa* and *S. platyphylla*). The flowers have lighter centres and probably appear even more vividly coloured in the ultra-violet spectrum. Like most Goodeniaceae, they

are designed for insect pollination. Blue-banded bees (family Anthophoridae, possibly from at least two species) are frequently observed working these flowers, and their upper surfaces become heavily dusted with pollen. It is possible that the plants might be very important in the life cycles of these native bees. The blue-flowered *Agrostocrinum scabrum* can also occasionally be found during these months, though its main flowering period is in spring, while the lilac flowered *Dichopogon capillipes* also flowers in summer. These are buzz-pollinated by blue-banded bees (Powell and Emberson 1996).

Several families contain introduced as well as native species, eg Asteraceae, Iridaceae and Poaceae. It would appear that the introduced species do not change the flowering pattern (Figure 69 a,b,c), so where fauna pollination is concerned, the introduced plants may be in direct competition with the natives. Note, it was expected that the grasses would show two distinct growth peaks, corresponding to C3 and C4 species, however this was not the case, as few C4 species occur in this area.

During the study, flowering was not recorded in 11 species: seven (*Alternanthera nodiflora*, *Hydrocotyle lemnoides*, *Chenopodium melanocarpum*, *Glinus lotoides*, *Melaleuca raphiophylla*, *Persicaria prostrata*, *Potamogeton crispus*), occur only in the dam, which was not searched regularly and four are uncommon species (*Gahnia* aff. '*aristata*', *Amphibromus nervosus*, *Hypolaena* aff. '*viridis*', *Solanum linnaeanum*). No flowering was recorded in *Santalum acuminatum*, which is interesting. The populations are conspicuous, and the flowers were specifically searched for. This plant resprouts after fire, and Muir (1987)

records that *S. acuminatum* takes years to begin flowering. A further discussion of flowering and fire will be given in a forthcoming paper.

No population is now growing in an area that has more than seven years of growth since being burnt, so presumably, the plants will eventually flower.

Seven species flowered in all months of the year. They were: *Agrostocrinum scabrum*, *Hypochaeris glabra*, *Euphorbia pepus*, *Goodenia fasciculata*, *Grevillea bipinnatifida*, *Solanum nigrum*, and *Tripterococcus brunonis*. Three are opportunistic weeds, and the others responded to fire, or heavy rainfall. If the same criterion as Armstrong & Muir's (1994) 'almost continuous' - ie. up to 2 months' gap - is used, the total rises to 17 and includes: *Sonchus oleraceus*, *Echium plantagineum*, *Hibbertia hypericoides*, *Stachys arvensis*, *Linum trigynum*, *Verticordia pennigera*, *Melinis repens*, *Themeda triandra*, *Grevillea manglesioides* and *Grevillea pilulifera*. Again, a high proportion are weeds, presumably responding to disturbance regimes.

Because a species is shown as having an extended flowering time, it does not mean that all plants are in flower throughout the length of that time. *Hibbertia hypericoides*, for example, flowers from March through to December, but in fact populations in warm, exposed sites flower earliest, while those in sheltered, more humid situations may come into bloom as much as three months later. This would give a wide range of opportunity to any pollinator dependant on this plant.

There are two principle climatic events which may lead to variations in flowering period, and one stochastic one-

(a) topographic effect

The study area covers a vertical rise of 170m. It faces north, and so receives maximum insolation during the day. The low vegetation is no impediment to the passage of the frequent strong, drying easterlies or the sometimes moister westerlies. Higher in the landscape, and on exposed ridges, these forces will have greatest effect.

(b) orographic effect

As an elevated landform feature, the Knoll (see Figure 1) sometimes has low cloud which provides a small amount of extra precipitation to the upper sites. However, the top and eastern slopes of the central north-south ridge in the study area receive moisture from a cloud slug which moves down the valley from the two water supply dams upstream. At this point it hits the ridge and disperses, leaving the moisture it contained to sustain the wet granite meadows that are found on the eastern, but not the western side of the ridge.

(c) onset of first rains

Many species are keyed into action by a specific environmental event, the most obvious being the first heavy rains of autumn. *Drosera bulbosa* is a good example. Its flowers can burst out of the ground as little as 5 days after the rainstorm, as early as April or as late as June. *Stylidium repens* also responds similarly, it can flower heavily in summer, a week or so after a heavy storm. The same plant will flower again at the beginning of winter. *Dioscorea hastifolia* is also strongly controlled by the onset of the rains, but then secondarily influenced by topographic location, plants in shady areas coming into flower later than those in exposed sites.

Armstrong & Muir recorded seven species as having two periods of

flowering. Of the six which occur here, our records for five of them filled in the gaps; viz *Tricoryne elatior*, *Olearia paucidentata*, *Andersonia lehmanniana*, *Scaevola* (now *Goodenia*) *fasciculata* and *Lepidosperma angustatum* (now probably *L. tenue*). However, we recorded that *Laxmannia squarrosa* did not have a winter flush, but only flowered during spring and into early summer.

In addition, we found that *Goodenia caerulea* normally flowers in summer, but can have a smaller second flush in early winter. However, this does not occur in the year following a fire, when *G. caerulea* flowers most prolifically, but in subsequent years, as the main body of flowering in the population drops off.

CONSERVATION VALUE

Gooseberry Hill now has a considerable background of biological information, including extensive databases of the avifauna and flora (some of which are presented here), as well as a documented long-term fire history. Eight conservation priority plant species (*Pithocarpa corymbulosa*, *Senecio leucoglossus*, *Chorizandra multiarticulata*, *Acacia oncinophylla*, *Rinzia crassifolia*, *Nemcia acuta*, *Boronia tenuis*, *Lasiopetalum bracteatum*) and one declared rare fauna species (*Anthocercis gracilis*) occur there, as well as three of 10 Darling Scarp endemics listed by Heddle and Marchant (1983); viz, *Boronia tenuis*, *Synaphea acutiloba* and *S. pinnata*. The area encompasses a full catena of Scarp landscapes, from riverine to lateritic cap-rock, with numerous granite outcrops, dolerite dykes and winter-wet herblands. Its inclusion in the adjoining Gooseberry Hill National Park would greatly enhance the diversity and conservation value of this existing park.

REFERENCES

- ARMSTRONG, P.G. and MUIR, B.G. 1994. A flowering calendar for John Forrest National Park. *Western Australian Naturalist* 19: 301-338.
- ATKINS, K.J. 1999. *Declared Rare and Priority Flora List for Western Australia*. Department of Conservation and Land Management, Perth.
- BAKER, R.J. and NELDER, J.A. 1978. *The GLIM system*. Royal Statistical Society, Oxford.
- BROOKER, M. and ROWLEY, I. 1991. Impact of wildfire on the nesting behaviour of birds in heathland. *Wildlife Research* 18: 249-263.
- CHURCHWARD, H.M. and McARTHUR, W.M. 1980. *Landforms and soils of the Darling System, Western Australia*. Department of Conservation and Environment, Western Australia.
- CRANFIELD, R.J. and PARKER, C.M. 1992. Flowering calendar for reserve No. 3694 in metropolitan Perth. *Western Australian Naturalist* 19: 48-59.
- HEDDLE, E.M. and MARCHANT, N.G. 1983. The status of vegetation on the Scarp. In J.D. Majer, editor. *Scarp Symposium*. Report No. 10. pp 11-16. Environmental Studies Group, Western Australian Institute Technology.
- HUSSEY, B.M.J. 1993. Naturalised plants on the southern slopes of the western end of the Helena Valley, Western Australia. *Western Australian Naturalist* 19: 219 - 240.
- HUSSEY, B.M.J. 1995. D.L. Serventy's Gooseberry Hill plant list. *Western Australian Naturalist* 20: 205-209.
- MAJER, J.D. 1981. A flowering calendar for Karragullen, a northern jarrah forest locality. *Western Australian Herbarium Research Notes*. 5: 19-28.

- MARCHANT, N.G., WHEELER, J.R., RYE, B.L., BENNETT, E.M., LANDER, N.S. and MacFARLANE, T.D. 1987. *Flora of the Perth Region*. Western Australian Herbarium, Perth.
- MILEWSKI, A.V. and DAVIDGE, C. 1981. The physical environment, floristics and phenology of a Banksia woodland near Perth, Western Australia. *Western Australian Herbarium Research Notes*. 5: 29-48.
- MUIR, B.G. 1987. Time between germination and first flowering of some perennial plants. *Kingia* 1 (1): 75-83.
- POWELL, R. and EMBERSON, J. 1996. *Growing Locals: gardening with local plants in Perth*. Western Australian Naturalists Club, Perth.
- WARWICK, B.L. 1932. Probability tables for Mendelian ratios with small numbers *Texas Agricultural Experimental Station Bulletin* No. 463.
- WORSLEY ALUMINA Pty Ltd. 1985. *Worsley Alumina Project, flora and fauna studies phase two*. Worsley Alumina Pty Ltd, Perth.

Appendix 4. Plant species recorded on Gooseberry Hill 1983 - 1999, showing (a) conservation code (Atkins 1999); (b) the number of sites each species was recorded on during the plant census (a blank indicates not recorded during census); (c) statistically significant results from GLM models relating species occurrences to environmental attributes (for the 3 soil types, a plus indicates the most preferred soil type; for aspect, E indicates a preference for E/NE over the rest and W indicates a preference for W/NW over the rest; for gradient and number of years since burnt previously, a plus indicates a significant positive relationship, a minus indicates a significant negative relationship); (d) ▼ indicates distribution map in Appendix 5; and (e) the flowering calendar (open squares indicate occasional flowering, filled squares indicate main flowering period). Species marked with an asterisk are introduced to Gooseberry Hill.

	conservation code	no. sites recorded on	laterite	dolomite	granite	aspect	gradient	years since burnt	distribution map	flowering months																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
										July	August	September	October	November	December	January	February	March	April	May	June																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
Adiantaceae																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	</

	conservation code	no. sites recorded on	laterite	dolerite	granite	aspect	gradient	years since burnt	distribution map	flowering months																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
										July	August	September	October	November	December	January	February	March	April	May	June																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
Asteraceae																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			</

	conservation code	no. sites recorded on	laterite	dolerite	granite	aspect	gradient	years since burnt	distribution map	flowering months																
										July	August	September	October	November	December	January	February	March	April	May	June					
Campanulaceae																										
<i>Wahlenbergia capensis</i> *		1											■													
<i>Wahlenbergia gracilentia</i>		402				W	+	+	▼			■	■													
Caryophyllaceae																										
<i>Cerastium glomeratum</i> *												□	□	■												
<i>Petrothapsia velutina</i> *		60											■	■	□											
<i>Polycarpon tetraphyllum</i> *													■	■												
<i>Silene gallica</i> *		183										□	□	■	□											
<i>Spergula arvensis</i> *												■	■													
Casuarinaceae																										
<i>Allocasuarina huegeliana</i>		11											□	■	■	□										
<i>Allocasuarina humilis</i>		97							▼		■	■	□						□	□	■	■				
Centrolepidaceae																										
<i>Aphelia drummondii</i>		1											□	■	■	□										
<i>Centrolepis aristata</i>		75			+	W	-		▼				■	■												
<i>Centrolepis drummondiana</i>		119			+				▼			□	■	■												
<i>Centrolepis glabra</i>													■	■												
Chenopodiaceae																										
<i>Chenopodium melanocarpum</i>										phenology not recorded																
Colchicaceae																										
<i>Baeometra uniflora</i> *														■												
<i>Burchardia multiflora</i>		208		+			-	-	▼		■	■	□										■			
<i>Burchardia umbellata</i>		211							▼		■	■	■										□			
<i>Wumbea dioica</i>		141	+			E	+	-	▼		■	■	■										□			
<i>Wumbea pygmaea</i>		28																					■			
<i>Wumbea tenella</i>		5									■	□														
Convolvulaceae																										
<i>Convolvulus erubescens</i>														□	■	■	□	□	□	□						
Crassulaceae																										
<i>Crassula colorata</i>		85	+				-	-	▼		■	■	■	□									■			
<i>Crassula decumbens</i>		13									■	■	■	□	□								□			
<i>Crassula peduncularis</i>												■														
Cyperaceae																										
<i>Chorizandra enodis</i>		1														■										
<i>Chorizandra multiarticulata</i>	P3	2											■													
<i>Cyathochaeta avenacea</i>		9												□	■	■										
<i>Cyperus tanellus</i> *													■	■	■											
<i>Gahnia</i> aff. 'aristata'		1								phenology not recorded																

	conservation code	no. sites recorded on	laterite	dolerite	granite	aspect	gradient	years since burnt	distribution map	flowering months															
										July	August	September	October	November	December	January	February	March	April	May	June				
Cyperaceae cont.																									
<i>Isolepis congrua</i>											■	■	■												
<i>Isolepis cyperoides</i>													■												
<i>Isolepis marginata</i>		364		+					▼		■	■	■	■											
<i>Lepidosperma 'U3' (K. Wilson)</i>		40		+			+	-	▼					■	■				■	■	■				
<i>Lepidosperma effusum</i>		16												■	■					■	■	■			
<i>Lepidosperma leptostachyum</i>		92		+				-	▼					■	■					■	■	■			
<i>Lepidosperma pubisquamum</i>		100			+			-	▼											■	■	■			
<i>Lepidosperma tenue</i>		208	+						▼	■		■								■	■	■			
<i>Mesomelaena pseudostygia</i>																				■	■	■			
<i>Mesomelaena tetragona</i>		47									■									■	■	■			
<i>Schoenus armeria</i>		4										■								■	■	■			
<i>Schoenus 'brevisetis'</i>		7													■	■									
<i>Schoenus graminatophyllus</i>		92							▼	■	■	■	■							■	■	■			
<i>Schoenus nanus</i>		3										■													
<i>Schoenus odontocarpus</i>		24										■	■	■											
<i>Schoenus sculptus</i>		3										■													
<i>Schoenus subflavus</i>		20										■	■	■											
<i>Schoenus unispiculatus</i>		39									■	■	■	■											
<i>Tetralia octandra</i>		81	+			E	-		▼	■	■	■	■	■	■					■	■	■			
Dasypogonaceae																									
<i>Calectasia cyanea</i>												■													
<i>Kingia australis</i>		1									■														
<i>Lomandra caespitosa</i>												■													
<i>Lomandra micrantha</i>		8									■	■													
<i>Lomandra nigricans</i>											■														
<i>Lomandra preissii</i>		1								■										■	■	■			
<i>Lomandra</i> spp.		6																							
<i>Lomandra suaveolens</i>		22																		■	■	■			
<i>Xanthorrhoea preissii</i>		370				E	-		▼			■	■	■	■	■									
Dilleniaceae																									
<i>Hibbertia aurea</i>		83		+			+	+	▼	■	■	■	■	■	■					■	■	■			
<i>Hibbertia commutata</i>		139	+			E	-		▼	■	■	■	■	■	■					■	■	■			
<i>Hibbertia hypericoides</i>		327					-		▼	■	■	■	■	■	■	■				■	■	■			
<i>Hibbertia serrata</i>										■	■	■	■	■	■										
<i>Hibbertia spicata</i>		103					+	-	▼	■	■	■	■	■	■	■									
<i>Hibbertia subvaginata</i>		130		+			+	+	▼	■	■	■	■	■	■	■				■					
Dioscoreaceae																									
<i>Dioscorea hastifolia</i>		132	+			W	+	-	▼	■								■	■	■	■	■			
Droseraceae																									
<i>Drosera bulbosa</i>		44							▼											■	■	■			
<i>Drosera erythrorhiza</i>		115						-	▼														■		
<i>Drosera gigantea</i>		13									■	■	■	■											
<i>Drosera glanduligera</i>		108		+			-		▼		■	■	■	■											
<i>Drosera heterophylla</i>		15								■	■	■	■												
<i>Drosera leucoblasta</i>														■											

	conservation code	no. sites recorded on	late	dolerite	granite	aspect	gradient	years since burnt	distribution map	flowering months											
										July	August	September	October	November	December	January	February	March	April	May	June
Droseraceae cont.																					
<i>Drosera macrantha</i>		85	+				+	+	▼	■	■	■	□							□	■
<i>Drosera menziesii</i>		438		+					▼		■	■	■								
<i>Drosera pallida</i>		114	+			E	+		▼	■	■	■									
<i>Drosera platystigma</i>		5								■	■	■	□								
<i>Drosera stolonifera</i>		145			+			+	▼	■											□
Epacridaceae																					
<i>Andersonia aristata</i>												■									
<i>Andersonia lehmanniana</i>		7								■	■	■	□			□	□	□	□	■	■
<i>Astroloma ciliatum</i>		2								■	■	■									■
<i>Astroloma pallidum</i>		59		+			+	-	▼	■	■	■				□	□	□	□	■	■
<i>Leucopogon cymbiformis</i>		14											□	■	■						
<i>Leucopogon propinquus</i>		3								□	■	□								■	
<i>Leucopogon pulchellus</i>		113			+			+	▼	■	■	■	□	□							
<i>Lysinema ciliatum</i>										■											
Euphorbiaceae																					
<i>Euphorbia peplus</i> *		2								□	□	□	■	■	■	■	■	■	■	■	□
<i>Phyllanthus calycinus</i>		118	+					-	▼	□	■	■	■	■	□						
<i>Poranthera microphylla</i>		68				E		-	▼		■	■	■	■							
Fumariaceae																					
<i>Fumaria caprolepta</i> *		4								■	■	■	■	■				□	□	□	■
<i>Fumaria muralis</i> *		4									□	■	□	□							
Gentianaceae																					
<i>Centaurium erythraea</i> *		179												■	■	■	■		□		
<i>Centaurium tenuiflorum</i> *														■							
<i>Cicendia filiformis</i> *		8									□	■	■	□							
Geraniaceae																					
<i>Erodium botrys</i> *		142									■	■	■	■	□						
Goodeniaceae																					
<i>Dampiera alata</i>										□	■	■	■	■							
<i>Dampiera linearis</i>										■	■	■	■	■		□			□		
<i>Goodenia caerulea</i>		101		+		E		-	▼		■	■	■	■	■	■	□			□	□
<i>Goodenia fasciculata</i>		184			+	W			▼	□	■	■	■	■	■	■	■	□	□	□	□
<i>Goodenia micrantha</i>		74							▼			■	■	■	■	■					
<i>Lechenautia biloba</i>		1									■	■	■	■							
<i>Scaevola calliptera</i>		1											■								
<i>Scaevola glandulifera</i>		27											■	■	■	■	■	□	□	□	□
<i>Scaevola pilosa</i>											□		■	■	■	■			□	□	
<i>Scaevola platyphylla</i>											□	■	■	■	■	□					
Haemodorumaceae																					
<i>Anigozanthos bicolor</i>		47							▼	■	■	■	□								
<i>Anigozanthos manglesii</i>		3								□	■	■	■								
<i>Conostylis androstemma</i>		26								■											■
<i>Conostylis setigera</i>		58							▼	□	■	■	■								
<i>Haemodorum brevisepalum</i>		74			+	W	-		▼				■	■							

	conservation code	no. sites recorded on	laterite	dolerite	granite	aspect	gradient	years since burnt	distribution map	flowering months																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
										July	August	September	October	November	December	January	February	March	April	May	June																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
Haemodoraceae cont.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							</

	conservation code	no. sites recorded on	laterite	dolerite	granite	aspet	gradient	burnt	distribution map	flowering months											
										July	August	September	October	November	December	January	February	March	April	May	June
Laureaceae																					
<i>Cassytha glabella</i>		31																			
<i>Cassytha pomiformis</i>		141						+	▼			□	□								
<i>Cassytha racemosa</i>		12										□	■	■	■	■	■	□			
Lineaceae																					
<i>Linum marginale</i>		1										□	□		■						
<i>Linum trigynum</i> *		68										□	□	■	■	■	■	□	□		□
Lobeliaceae																					
<i>Isotoma hypocrateriformis</i>		60					-	+	▼					■	■	■					
<i>Lobelia heterophylla</i>		40													□	■	■	■			
<i>Lobelia rhombifolia</i>													□	■	□			■	■		
<i>Lobelia rhytidospema</i>		239							▼					□	■	■	■				
<i>Lobelia tenuior</i>		1												■							
<i>Monopsis debilis</i> *														■	■	■					
Loganiaceae																					
<i>Logania campanulata</i>																□	■	□			
Loranthaceae																					
<i>Amyema miquellii</i>																		□	■	□	
<i>Amyema preissii</i>																	■	■	■		
<i>Nuytsia floribunda</i>		13															■	■	■		
Malvaceae																					
<i>Sida hookeriana</i>		3													■						
Mimosaceae																					
<i>Acacia alata</i>		2										■	■	□							□
<i>Acacia ericifolia</i>												□								■	■
<i>Acacia nervosa</i>												■									
<i>Acacia oncinophylla</i>	P3	29										□	□	■							
<i>Acacia pulchella</i>		779					W	+	▼			□	■	■	■	■	□				
<i>Acacia saligna</i>		15											□	■	□	□					
<i>Acacia sessilis</i>		153				+	W	+	▼			■	■	□						□	■
<i>Acacia teretifolia</i>												■	■	■						□	■
<i>Acacia willdenowiana</i>		1										■	■	■							
Molluginaceae																					
<i>Glinus lotoides</i> *										phenology not recorded											
Myrtaceae																					
<i>Baeckea camphoresmae</i>		180						-	▼			□				■	■	■	■	■	□
<i>Beaufortia purpurea</i>		58					E	+	▼						■	■	■	■	■	□	□
<i>Calothamnus hirsutus</i>												□	□				■	■	■	■	□
<i>Calothamnus quadrifidus</i>		411	+						▼				□	■	■	■	■	■	■	■	□
<i>Calothamnus sanguineus</i>		32											■	□	□					□	■
<i>Calytrix acutifolia</i>		28														■	■				
<i>Calytrix aurea</i>		1																■			

	conservation code	no. sites recorded on	laterite	dolerite	granite	scept	gradient	burnt	distribution map	flowering months																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
										July	August	September	October	November	December	January	February	March	April	May	June																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
Myrtaceae cont.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							

	conservation code	no. sites recorded on	laterite	dolomite	granite	espect	gradient	burnt	distribution map	flowering months											
										July	August	September	October	November	December	January	February	March	April	May	June
Orobanchaceae																					
<i>Orobancha minor</i> *		5																			
Oxellidaceae																					
<i>Oxalis corniculata</i> *		12								Q							Q				Q
<i>Oxalis glabra</i> *		1																	Q	Q	
<i>Oxalis pes-caprae</i> *														Q							
Papilionaceae																					
<i>Bossiaea ornata</i>											Q										
<i>Chorizema dicksonii</i>		10								Q					Q						
<i>Cytisus proliferus</i> *		1																			
<i>Daviesia cordata</i>																					
<i>Daviesia decurrens</i>		2																			
<i>Daviesia hakeoides</i>		9																			
<i>Daviesia horrida</i>		154		+				-	▼						Q						
<i>Daviesia polyphylla</i>		9								Q		Q									Q
<i>Gompholobium aristatum</i>		17														Q					
<i>Gompholobium marginatum</i>		239						+	▼	Q						Q					Q
<i>Gompholobium polymorphum</i>		9									Q										
<i>Gompholobium preissii</i>																					
<i>Gompholobium shuttleworthii</i>		53				E		-	▼												
<i>Hovea chorizemifolia</i>																				Q	
<i>Hovea pungens</i>		92		+				+	▼				Q	Q							
<i>Hovea trispema</i>		53		+					▼				Q								
<i>Isotropis cuneifolia</i>		55		+				+	▼	Q											Q
<i>Jacksonia alata</i>		8								Q					Q						
<i>Jacksonia restioides</i>																Q					
<i>Jacksonia stemberglana</i>										Q								Q			
<i>Kennedia coccinea</i>		6													Q						
<i>Kennedia prostrata</i>		5								Q				Q	Q						Q
<i>Kennedia stirlingii</i>		30												Q	Q						
<i>Lotus angustissimus</i> *		1																			
<i>Lotus suaveolens</i> *		30												Q	Q						
<i>Lupinus angustifolius</i> *		8												Q							
<i>Mirbelia ramulosa</i>		22								Q					Q						
<i>Mirbelia spinosa</i>		23																			
<i>Nemcia acuta</i>	P3	47																			
<i>Nemcia capitata</i>		44																			Q
<i>Nemcia spathulata</i>		387		+		W		+	▼	Q											
<i>Pultenaea ericifolia</i>																					
<i>Sphaerolobium medium</i>		15																			
<i>Templetonia biloba</i>		41									Q									Q	
<i>Trifolium angustifolium</i> *		2																			
<i>Trifolium arvense</i> *		1																			
<i>Trifolium campestre</i> *		134								Q											Q
<i>Trifolium dubium</i> *		15									Q				Q						
<i>Trifolium glomeratum</i> *		6												Q	Q						
<i>Trifolium subterraneum</i> *		59								Q					Q						Q
<i>Trifolium tomentosum</i> *																					
<i>Viminaria juncea</i>		1																			

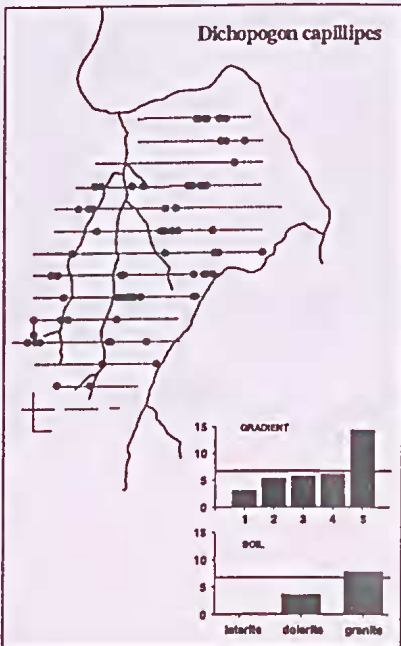
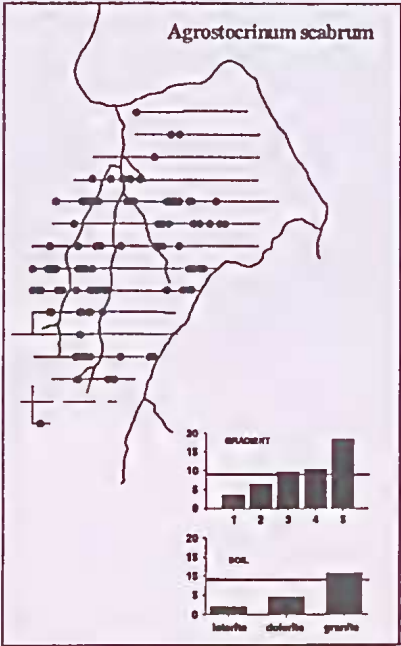
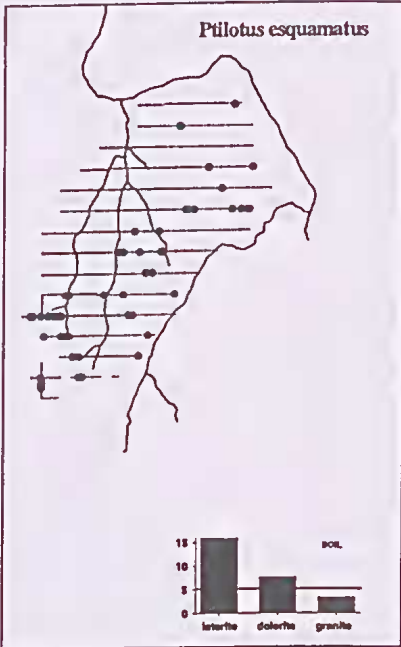
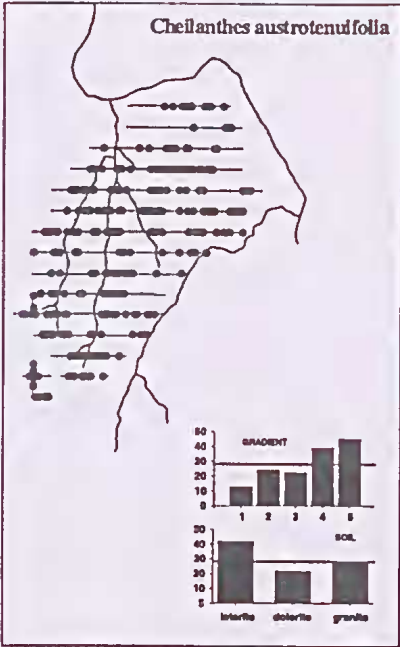
	conservation code	no. sites recorded on	laterite	dolomite	granite	espect	gradient	burnt	distribution map	flowering months											
										July	August	September	October	November	December	January	February	March	April	May	June
Phyllodraceae																					
<i>Phyllodrella pygmaea</i>		12																			
Phormiaceae																					
<i>Dianella revoluta</i>		4																			
<i>Stypandra glauca</i>		97	+					-	▼												
Phytolaccaceae																					
<i>Phytolacca octandra</i> *										□	■	□									
Pittosporaceae																					
<i>Billiardiera bicolor</i>		1																			
<i>Billiardiera drummondiana</i>										□	■	■	■	□							
<i>Pronaya fraseri</i>																					
Poaceae																					
<i>Aira caryophyllaea</i> *		812																			
<i>Amphibromus nervosus</i>										phenology not recorded											
<i>Amphipogon strictus</i>		138	+					-	▼	□	■	■	■								
<i>Aristida holothera</i>		2										□									
<i>Austrodanthonia caespitosa</i>																					
<i>Austrodanthonia semiannularis</i>																					
<i>Austrodanthonia</i> spp.		301							▼												
<i>Austrostipa campylachne</i>																					
<i>Austrostipa elegantissima</i>		28								□	■	■	□								
<i>Austrostipa macalpinel</i>		864		+	E	-	-	▼													
<i>Austrostipa semibarbata</i>												□	■								
<i>Austrostipa</i> spp.		177							▼												
<i>Austrostipa tenuifolia</i>												□	■	■							
<i>Avena barbata</i> *		194									□	■	■	■	□				□		
<i>Brachypodium distachyon</i> *		32								□	□								□	□	□
<i>Briza maxima</i> *		507								□	■	■	■	■							
<i>Briza minor</i> *		617									□	■	■	■							
<i>Bromus hordaceus</i> *		3																			
<i>Bromus rubens</i> *		1																			
<i>Cymbopogon oblectus</i>		1																			
<i>Cynodon dactylon</i> *																					
<i>Dayeuxia quadrifida</i>		69						-	▼												
<i>Dichelachne crinata</i>		6																			
<i>Ehrharta calycina</i> *		36																			
<i>Ehrharta longiflora</i> *		12								□	□	■	■	■	■	□				□	
<i>Eragrostis curvula</i> *		2																			
<i>Eragrostis elongata</i>																					
<i>Lolium rigidum</i> *		3																			
<i>Melinis repens</i> *																					
<i>Microlaena stipoides</i>		9																			
<i>Neurachne alopecuroides</i>		445	+		E			▼		□	■	■	■	□							
<i>Paspalum dilatatum</i> *																					
<i>Paspalum urvillei</i> *																					

	conservation code	no. sites recorded on	laterite	dolomite	granite	aspect	gradient	burnt	distribution map	flowering months											
										July	August	September	October	November	December	January	February	March	April	May	June
Poaceae cont.																					
<i>Pentstemonis airoides</i> *		107																			
<i>Poa annua</i> *																					
<i>Poa drummondiana</i>		29																			
<i>Polypogon monospermiensis</i> *		1																			
<i>Tetarrhena laevis</i>		16																			
<i>Themeda triandra</i>		15																			
<i>Vulpia bromoides</i> *																					
<i>Vulpia myuros</i> *		316																			
Polygalaceae																					
<i>Comesperma calymega</i>		26																			
<i>Comesperma ciliatum</i>		6																			
Polygonaceae																					
<i>Muehlenbeckia adpressa</i>		1																			
<i>Persicaria prostrata</i>										phenology not recorded											
Portulacaceae																					
<i>Calandrinia cortigioloides</i>		51			+				▼												
Potamogetonaceae																					
<i>Potamogeton crispus</i> *										phenology not recorded											
Primulaceae																					
<i>Anagallis arvensis</i> *		241																			
Proteaceae																					
<i>Banksia grandis</i>																					
<i>Conospermum huegelii</i>		56						+	▼												
<i>Dryandra armata</i>		101				E	-	-	▼												
<i>Dryandra nivea</i>		300				E	-	-	▼												
<i>Dryandra sessilis</i>		22																			
<i>Grevillea bipinnatifida</i>		68							▼												
<i>Grevillea endlicheriana</i>		56				W	+	-	▼												
<i>Grevillea manglioides</i>																					
<i>Grevillea pilulifera</i>		444							▼												
<i>Grevillea synapheae</i>																					
<i>Hakea cristata</i>		15																			
<i>Hakea ernaceae</i>		170							+	▼											
<i>Hakea incrassata</i>		93	+						-	▼											
<i>Hakea lissocarpa</i>		122	+						-	▼											
<i>Hakea myrtoides</i>		15																			
<i>Hakea petiolaris</i>		10																			
<i>Hakea prostrata</i>																					
<i>Hakea stenocarpa</i>		16																			
<i>Hakea trifurcata</i>		141				+			+	▼											
<i>Hakea undulata</i>		102				+			+	▼											
<i>Isopogon asper</i>		24																			
<i>Isopogon divergens</i>		2																			
<i>Isopogon dubius</i>		92			+		W	-	+	▼											

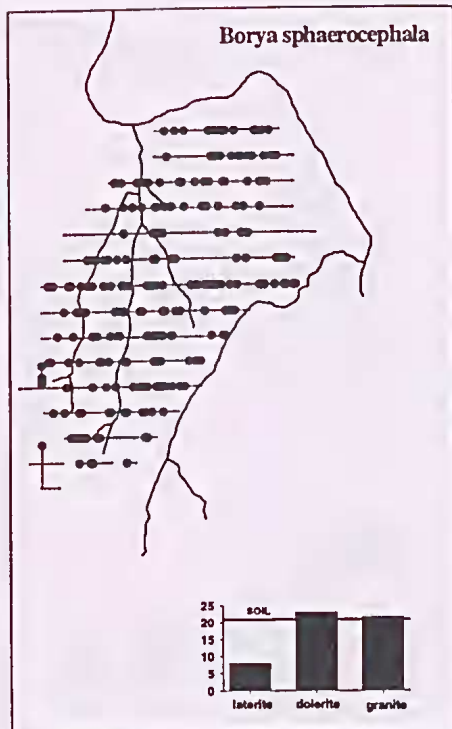
	conservation code	no. sites recorded on	leleite	dolerite	granite	aspect	gradient	burnt	distribution map	flowering months																											
										July	August	September	October	November	December	January	February	March	April	May	June																
Proteaceae cont.																																					
<i>Persoonia angustiflora</i>		4																																			
<i>Petrophile biloba</i>		156			+	W		+	▼		■	■	■	■	■	■												■	■								
<i>Petrophile seminuda</i>		21										■	■	■	■	■																					
<i>Petrophile striata</i>		9											■	■	■	■																					
<i>Synaphea acutifolia</i>		307			+			+	▼		■	■	■	■	■	■											■	■	■	■							
<i>Synaphea pinnata</i>		25										■	■	■	■	■																					
Restionaceae																																					
<i>Desmodioides fasciculatus</i>		13										■	■	■	■	■																					
<i>Desmodioides</i> sp.		282		+			+	-	▼			■	■	■	■	■																					
<i>Hypolaena</i> aff. 'viridis'		1								phenology not recorded																											
<i>Lepidobolus preissianus</i>		69		+		W			▼		■	■	■	■	■	■																					
<i>Lepyrodia macra</i>		2														■																					
Rhamnaceae																																					
<i>Cryptandra arbutiflora</i>		12									■	■																■	■								
<i>Cryptandra nutans</i>		4									■	■																■	■								
<i>Stenanthemum notiale</i>		30														■	■	■	■	■																	
<i>Trymalium floribundum</i>		7									■	■	■	■	■	■																					
<i>Trymalium ledifolium</i>		413				W	+	+	▼		■	■	■	■	■	■																					
Rosaceae																																					
<i>Acaena echinata</i> *																■																					
Rubiaceae																																					
<i>Galium divaricatum</i> *		83														■	■	■	■	■																	
<i>Opercularia vaginata</i>		125		+					▼		■	■	■	■	■	■																					
Rutaceae																																					
<i>Boronia cymosa</i>		6									■	■				■	■	■	■	■																	
<i>Boronia ovata</i>		4										■	■	■	■	■																					
<i>Boronia ramosa</i>		3									■	■	■	■	■	■																					
<i>Boronia tenuis</i>	P4	6									■	■	■	■	■	■																					
<i>Philothea spicata</i>											■																										
Santalaceae																																					
<i>Santalum acuminatum</i>		1								never found in flower																											
Sapindaceae																																					
<i>Diplopeltis huegelii</i>		107			+	W	+	+	▼		■	■	■	■	■	■												■	■	■	■						
Scrophulariaceae																																					
<i>Bartsia trixago</i> *		595														■	■	■	■	■																	
<i>Misopates orontium</i> *		67														■	■	■	■	■																	
<i>Perentuceella latifolia</i> *		119														■	■	■	■	■																	
<i>Perentuceella viscosa</i> *		34														■	■	■	■	■																	
Solanaceae																																					
<i>Anthocercis gracilis</i>	DRF	4										■																									
<i>Nicotiana rotundifolia</i>		7														■																					
<i>Solanum linnaeanum</i> *		2								phenology not recorded																											
<i>Solanum nigrum</i> *		3														■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■					

	conservation code	no. sites recorded on	laterite	dolomite	granite	aspect	gradient	burnt	distribution map	flowering months																				
										July	August	September	October	November	December	January	February	March	April	May	June									
Stackhousiaceae																														
<i>Stackhousia monogyna</i>		9																												
<i>Tripterococcus brunonis</i>		239			+	E	-	+	▼																					
Sterculiaceae																														
<i>Guichenotia sarotes</i>		1																												
<i>Lasiopetalum bracteatum</i>	P4	17																												
<i>Rulingia cygnorum</i>		7																												
<i>Thomasia foliosa</i>		19																												
<i>Thomasia glutinosa</i>		23																												
Stylidiaceae																														
<i>Levenhookia pusilla</i>		48	+			E			▼																					
<i>Levenhookia stipitata</i>		297			+				▼																					
<i>Stylidium affine</i>																														
<i>Stylidium brunonianum</i>		108				E			▼																					
<i>Stylidium bulbiferum</i>		260				W			▼																					
<i>Stylidium calcaratum</i>		210			+	E	+		▼																					
<i>Stylidium canosum</i>		1																												
<i>Stylidium dichotomum</i>		91			+		-	+	▼																					
<i>Stylidium ecome</i>		14																												
<i>Stylidium hispidum</i>		66					-	+	▼																					
<i>Stylidium petiolare</i>		20																												
<i>Stylidium pubigerum</i>		38																												
<i>Stylidium pycnostachyum</i>																														
<i>Stylidium repens</i>		53			+	E	-	+	▼																					
Thymelaeaceae																														
<i>Pimelea argentea</i>		8																												
<i>Pimelea ciliata</i>		32																												
<i>Pimelea imbricata</i>		170			+			+	▼																					
Tremandraceae																														
<i>Tetratheca hirsuta</i>		27																												
<i>Tetratheca nuda</i>		1																												
Typhaceae																														
<i>Typha orientalis</i> *																														
Urticaceae																														
<i>Parietaria debilis</i>																														
Violaceae																														
<i>Hybanthus floribundus</i>																														
Zamiaceae																														
<i>Macrozamia riedlei</i>		47							▼	phenology not recorded																				

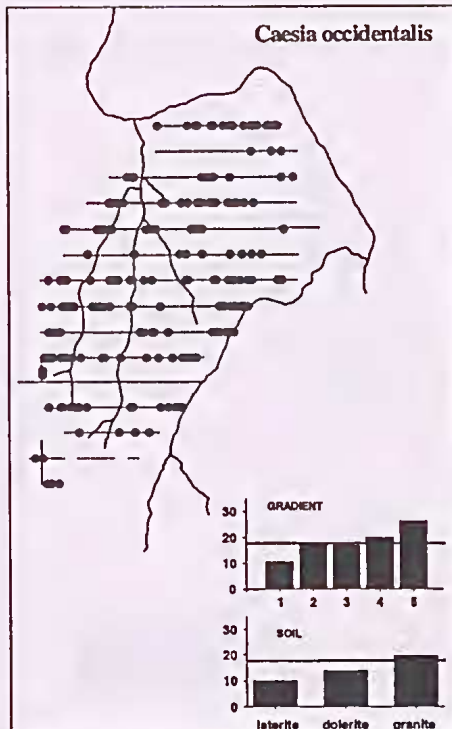
Appendix 5. Distribution maps and graphs for some of the more common native species on Gooseberry Hill (i.e. those recorded on 50 or more sites). Grid lines on the maps represent the distribution of sampling sites, placed 10m apart along transect lines 200m apart. Histograms represent the percentage of sites on which the species was recorded. Horizontal lines on graphs indicate the expected percentages.



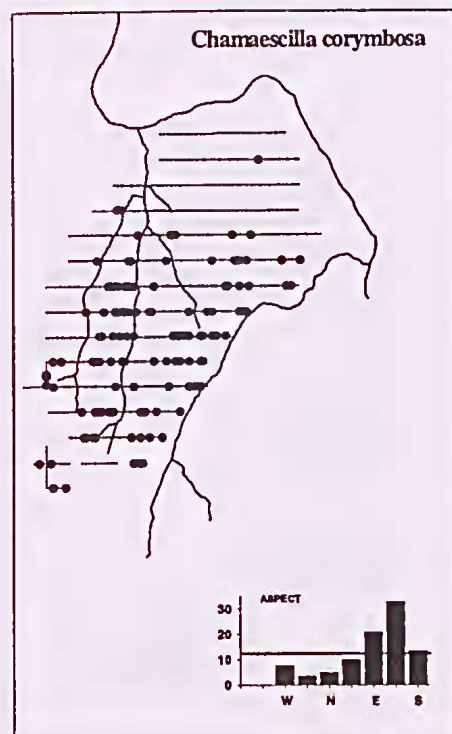
Borya sphaerocephala



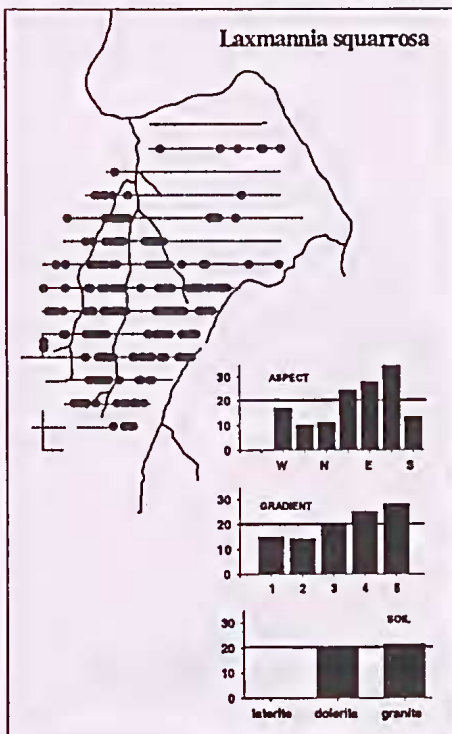
Caesia occidentalis



Chamaescilla corymbosa



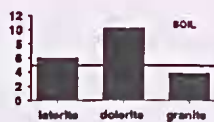
Laxmannia squarrosa



Thysanotus manglesianus



Thysanotus sparteus



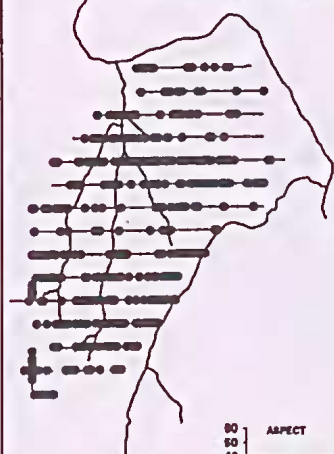
Thysanotus tenellus



Tricoryne elatior



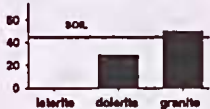
Homaloscadium homolocarpum



Hydrocotyle callicarpa



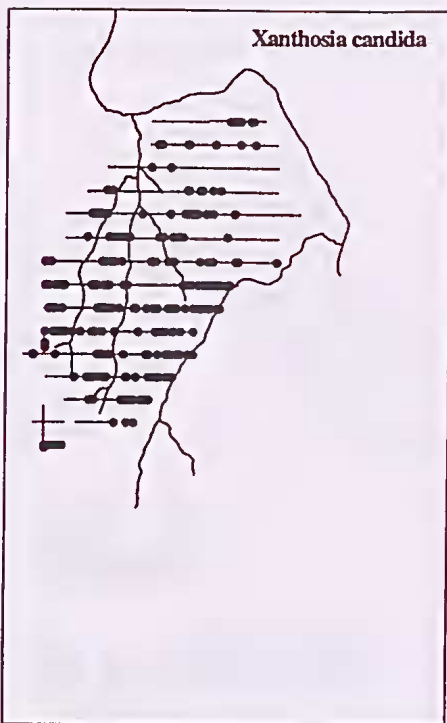
Trachymene coerulea



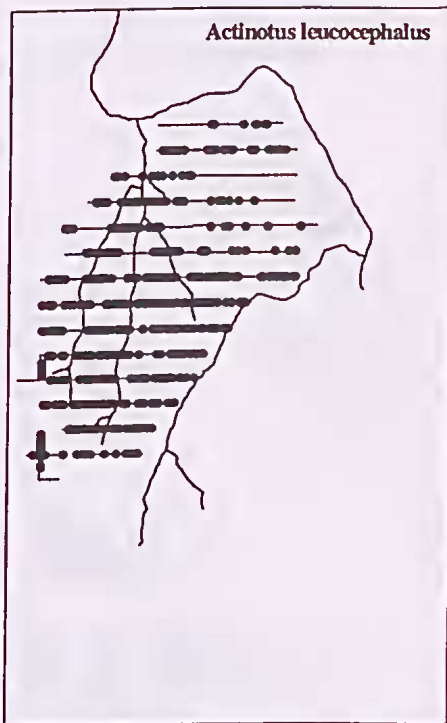
Trachymene pilosa



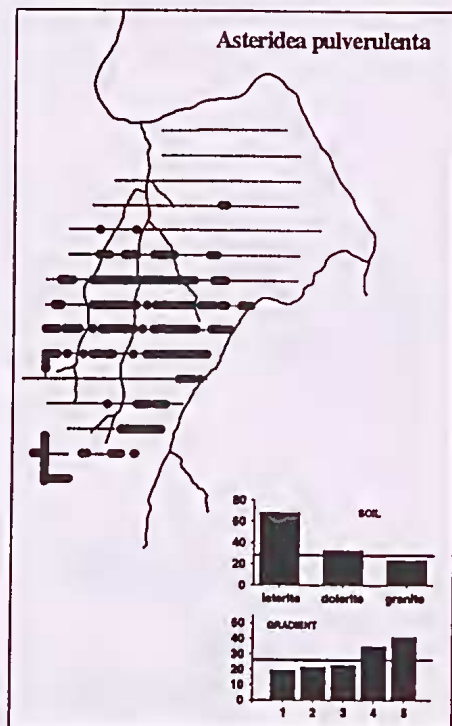
Xanthosia candida



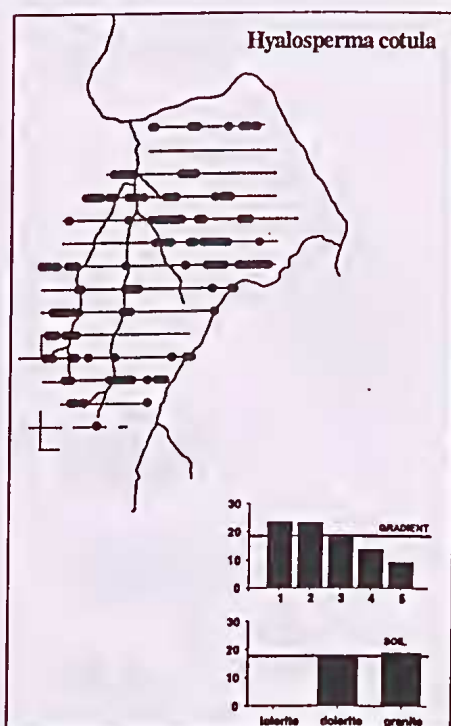
Actinotus leucocephalus



Asteridea pulverulenta



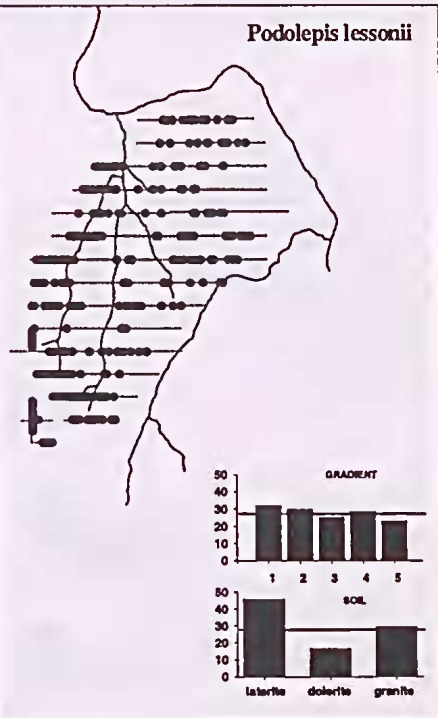
Hyalosperma cotula



Olearia paucidentata



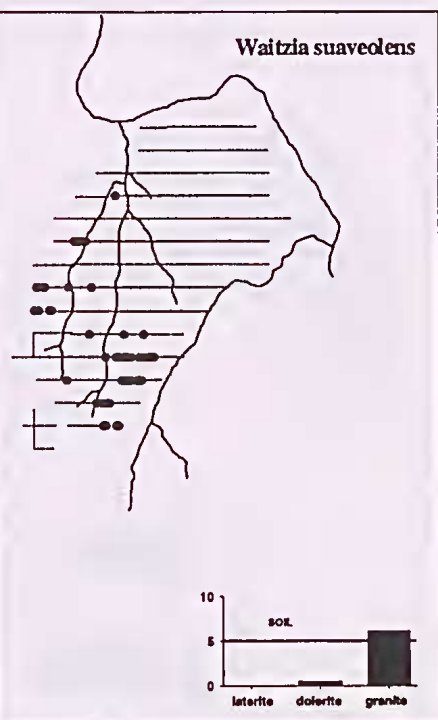
Podolepis lessonii



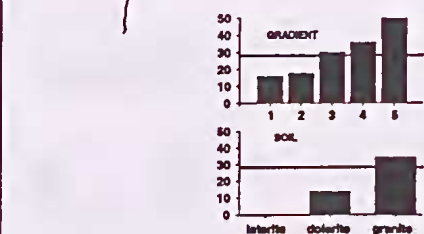
Pterochaeta paniculata



Waitzia suaveolens



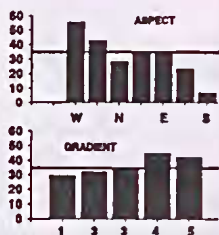
Rhodanthe corymbosa



Senecio hispidulus



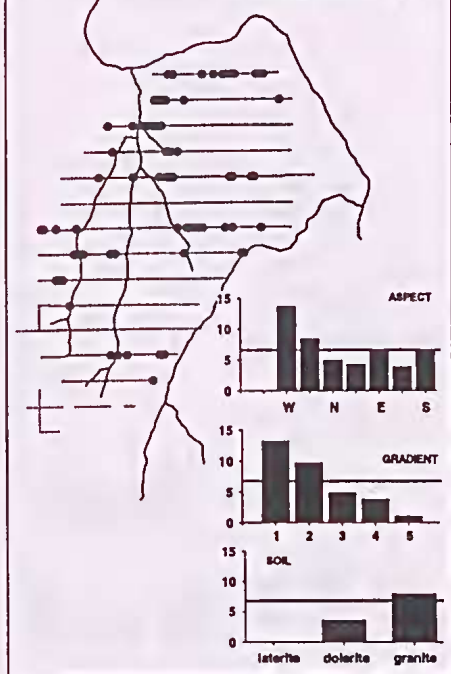
Wahlenbergia gracilentia



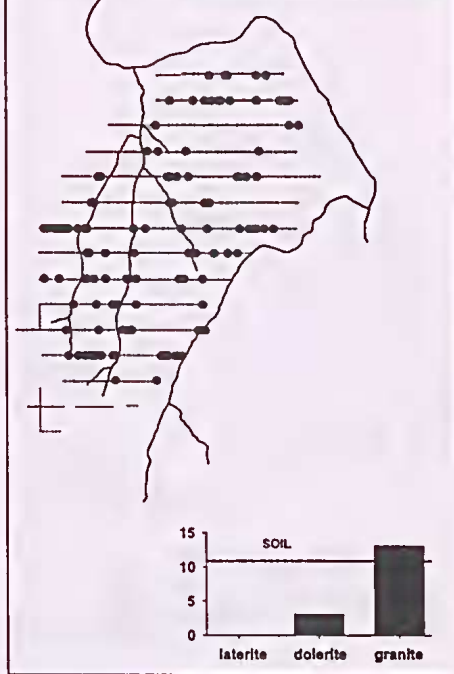
Allocasuarina humilis



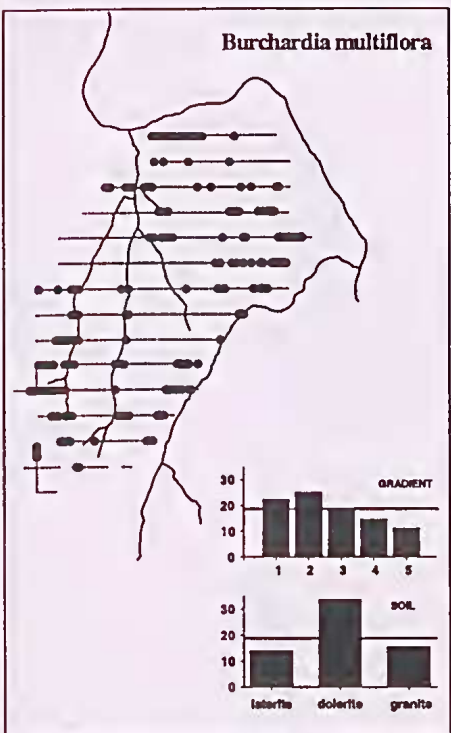
Centrolepis aristata



Centrolepis drummondiana

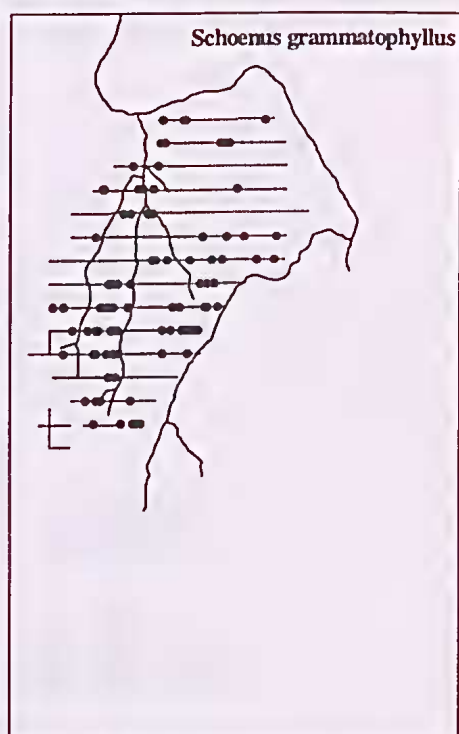
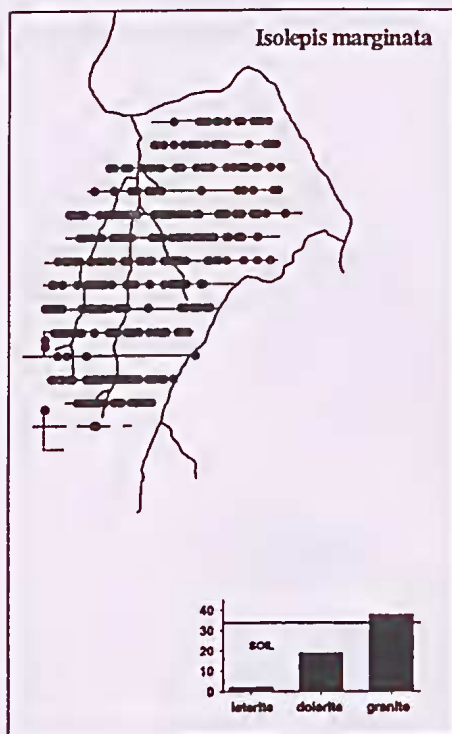
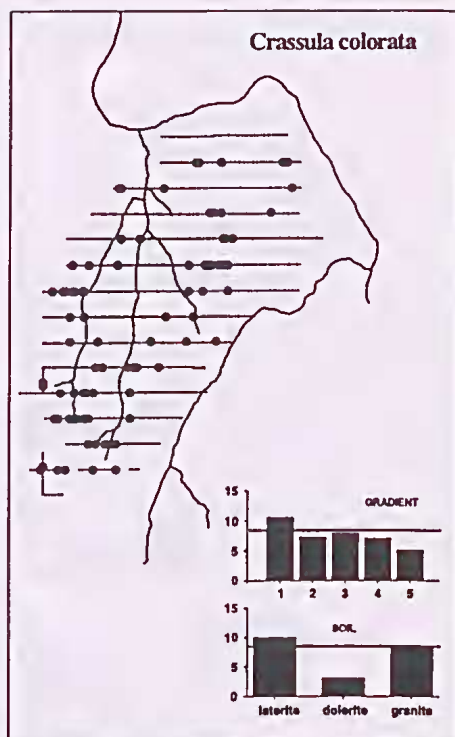
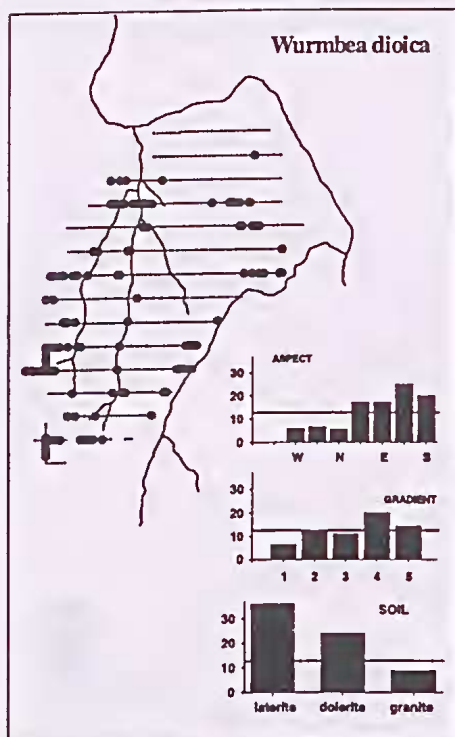


Burchardia multiflora

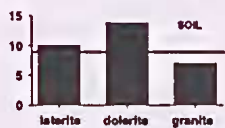


Burchardia umbellata





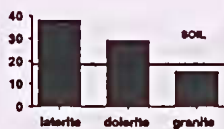
Lepidosperma leptostachyum



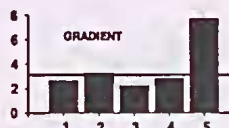
Lepidosperma pubisquamum



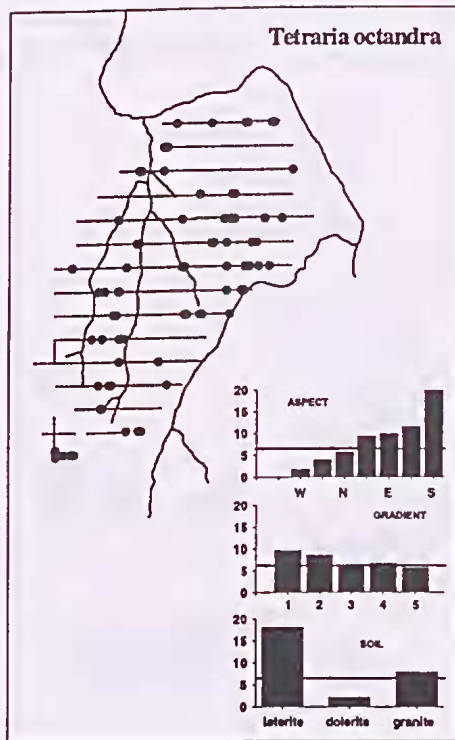
Lepidosperma tenue



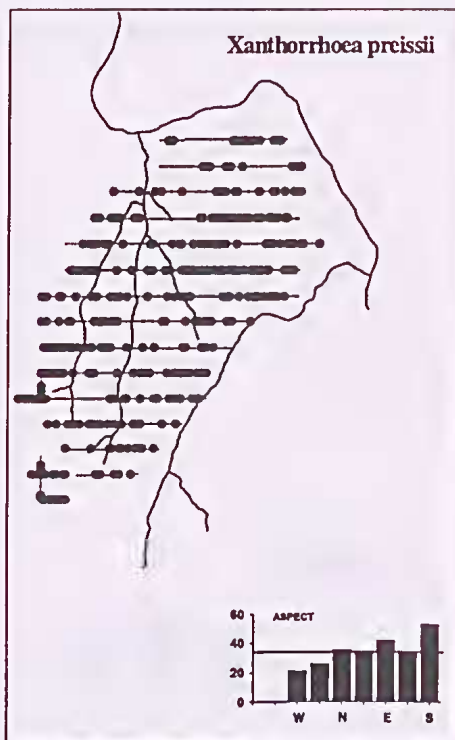
Lepidosperma U3



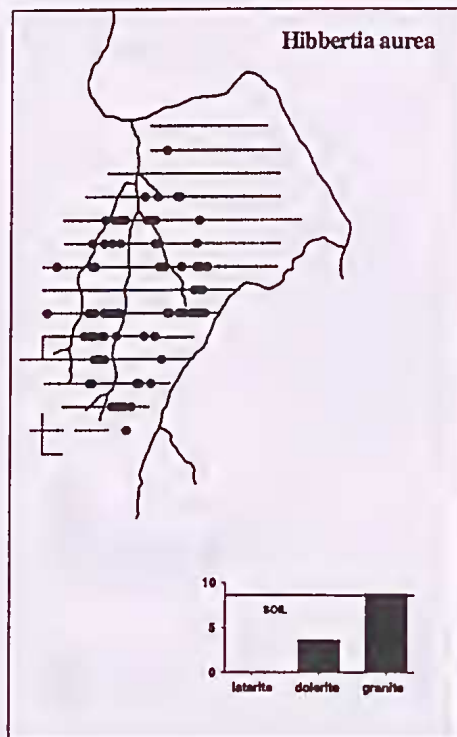
Tetraria octandra



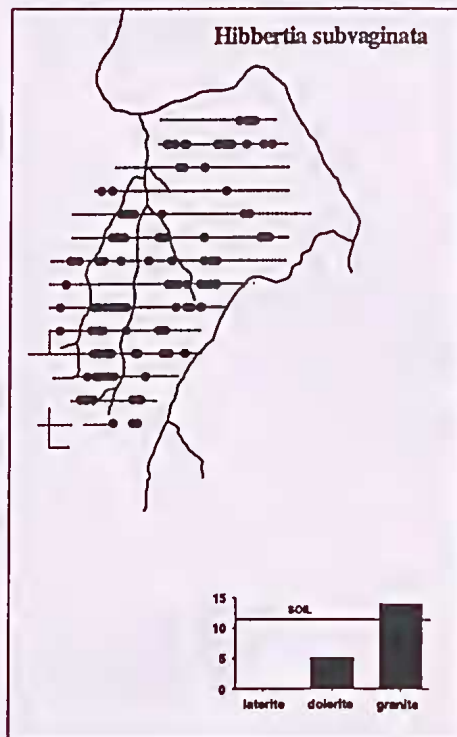
Xanthorrhoea preissii



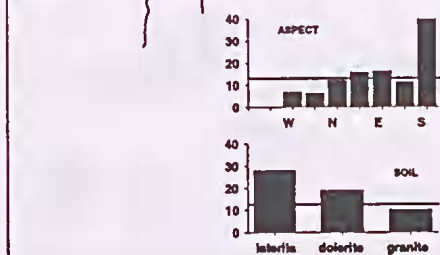
Hibbertia aurea



Hibbertia subvaginata



Hibbertia commutata



Hibbertia hypericoides

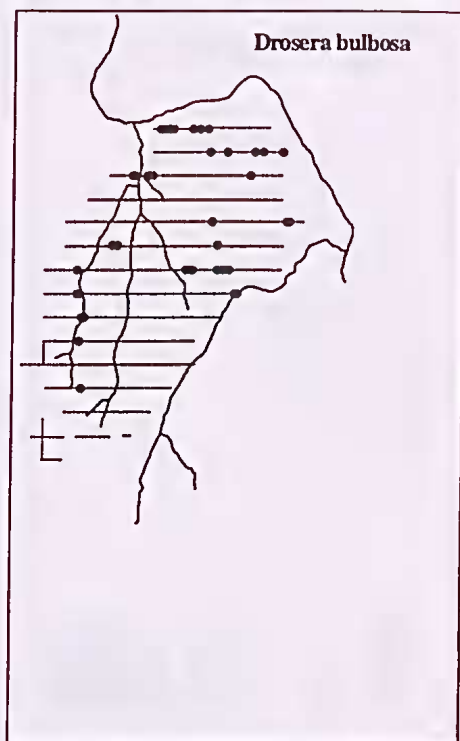
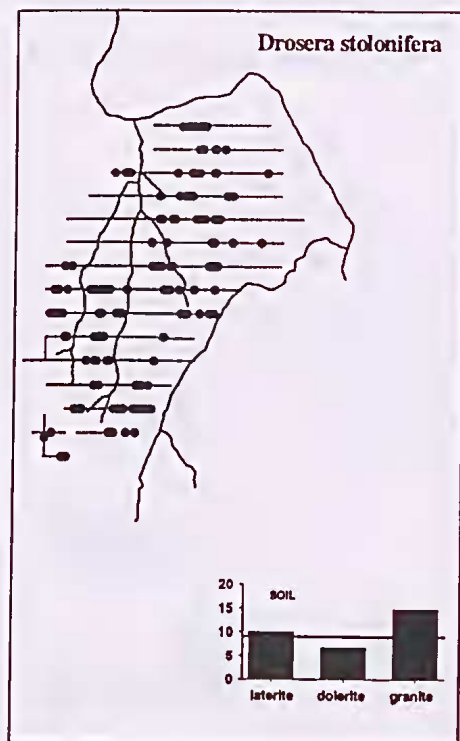
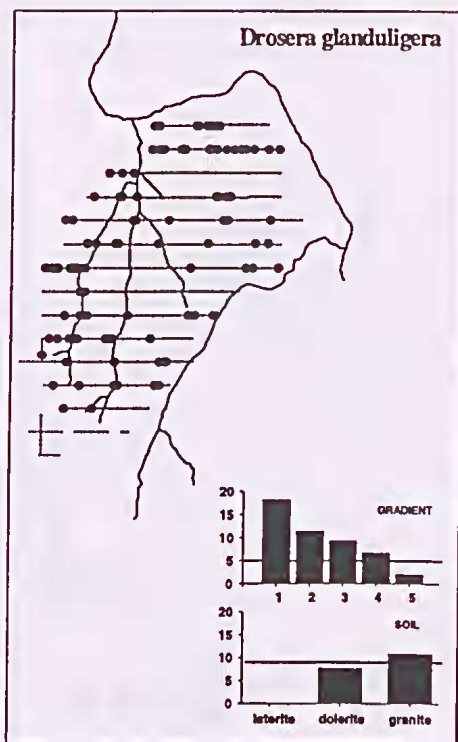
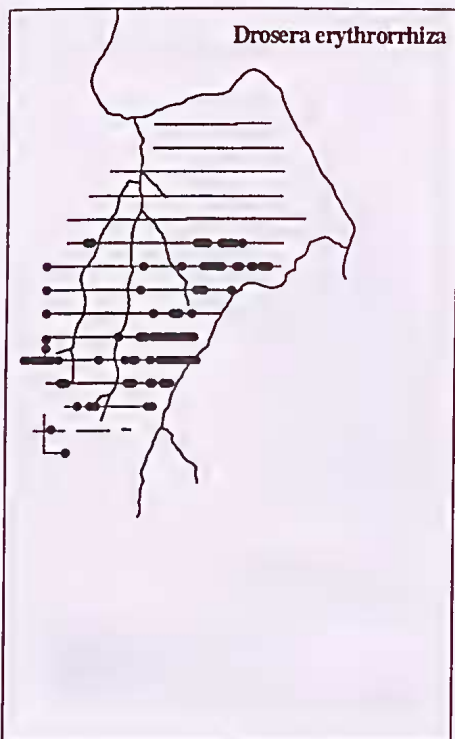


Hibbertia spicata

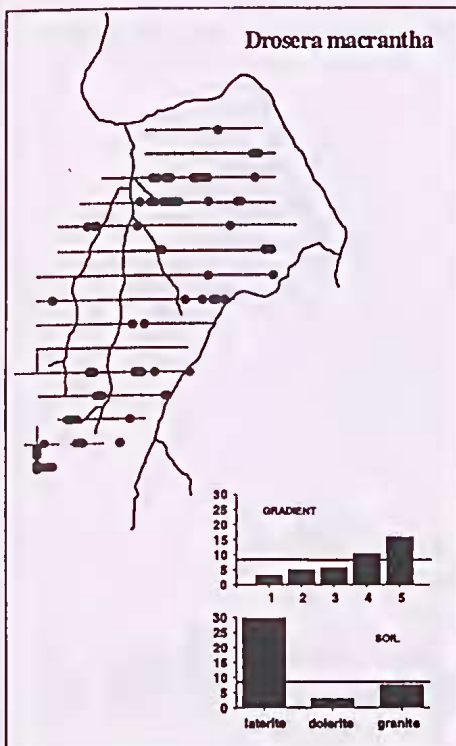


Dioscorea hastiflora

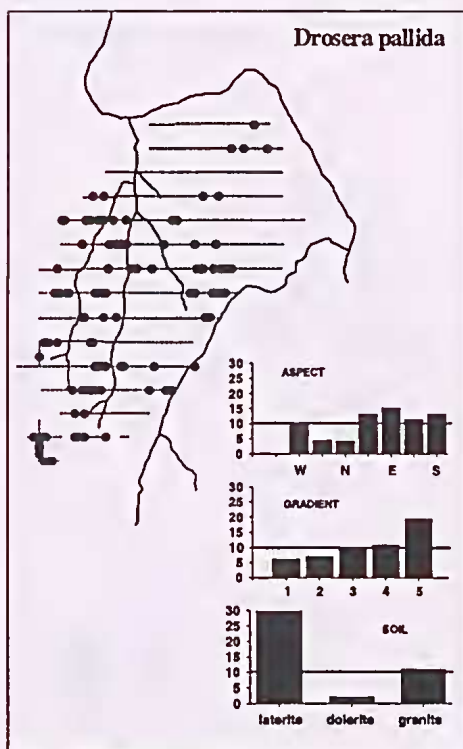




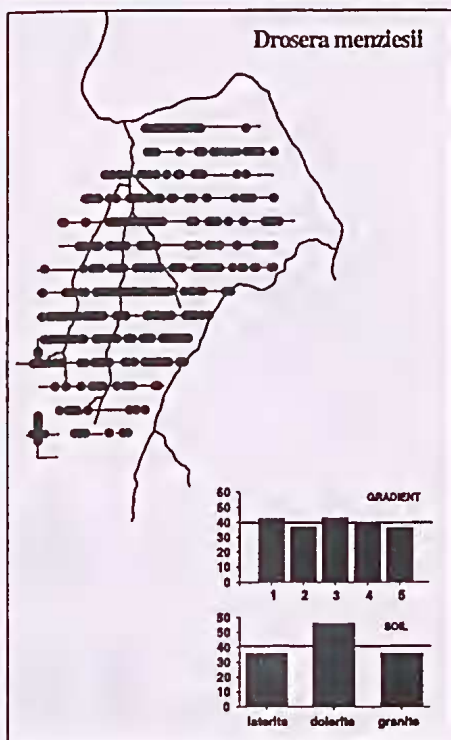
Drosera macrantha



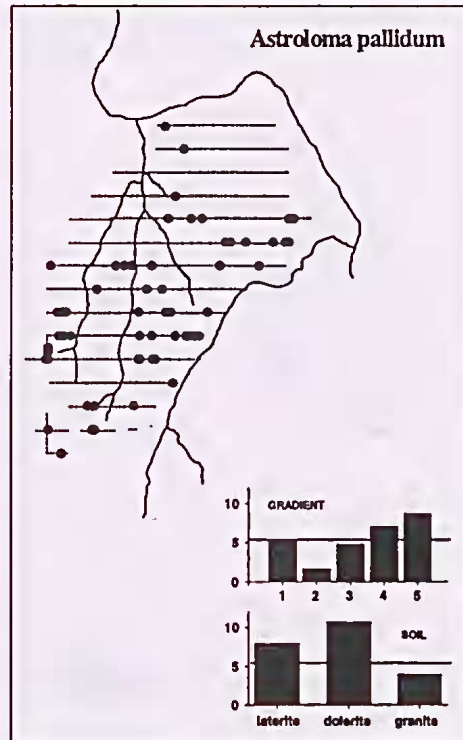
Drosera pallida



Drosera menziesii



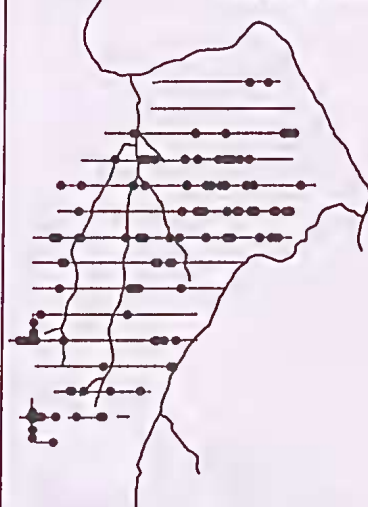
Astroloma pallidum



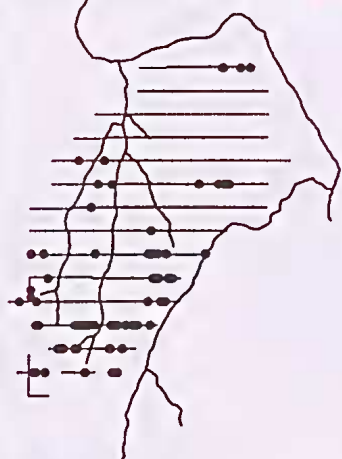
Leucopogon pulchellus



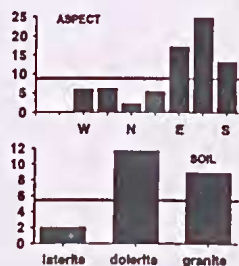
Phyllanthus calycinus



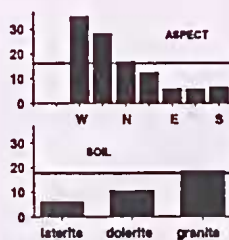
Poranthera microphylla



Goodenia caerulea



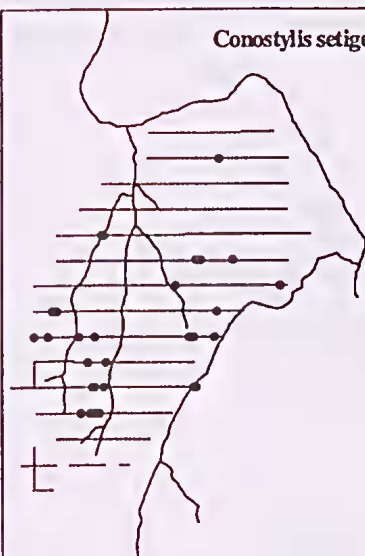
Goodenia fasciculata



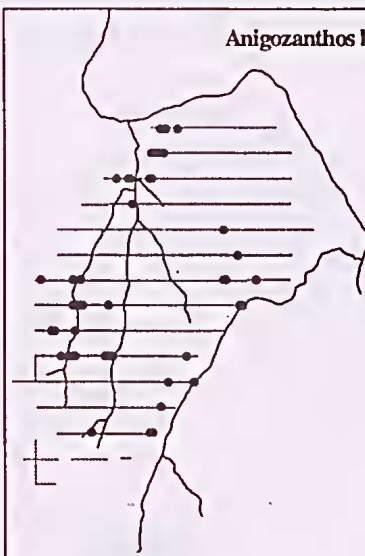
Goodenia micrantha



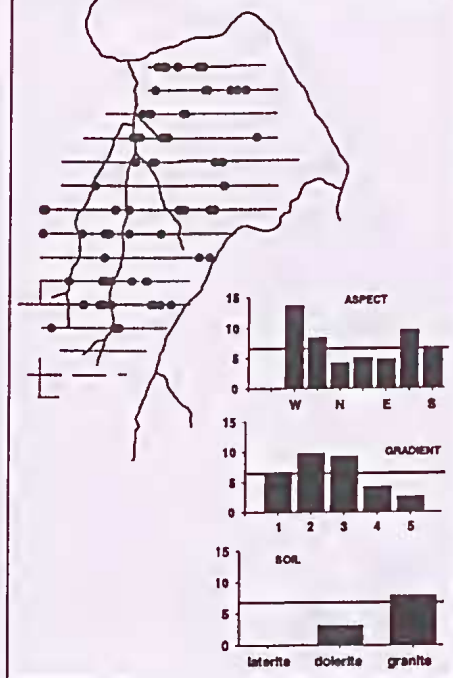
Conostylis setigera



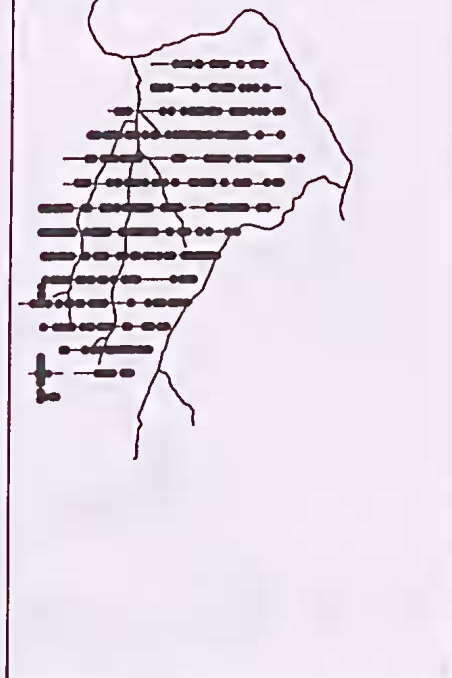
Anigozanthos bicolor



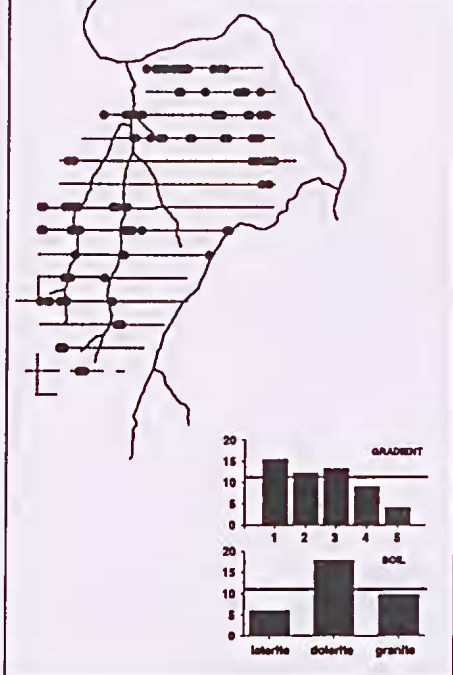
Haemodorum brevisepalum



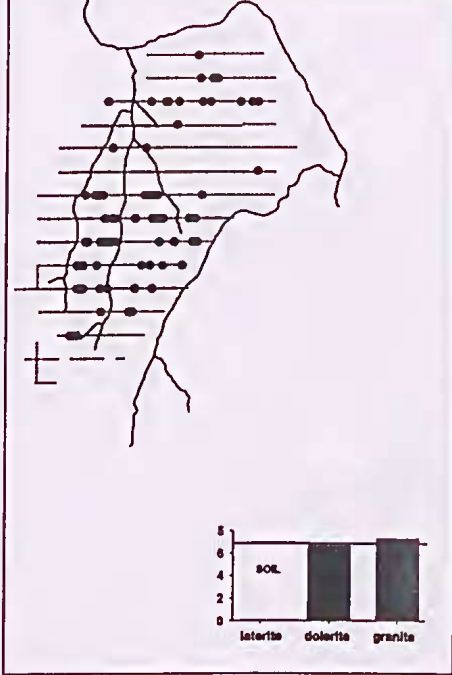
Haemodorum laxum



Haemodorum simplex



Haemodorum simulans



Haemodorum spicatum



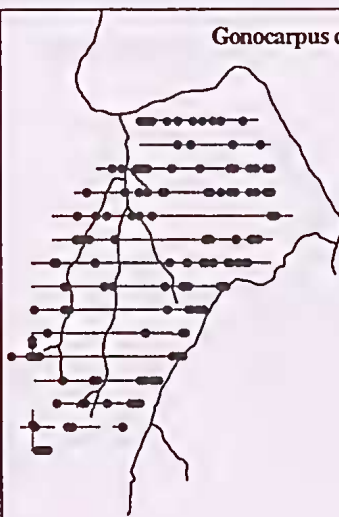
Tribonanthes brachypetala



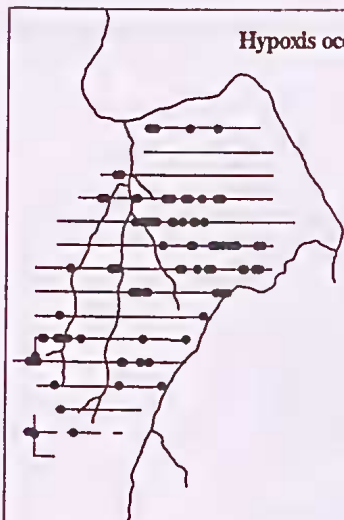
Tribonanthes longipetala



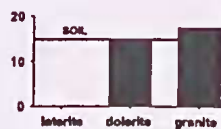
Gonocarpus cordiger



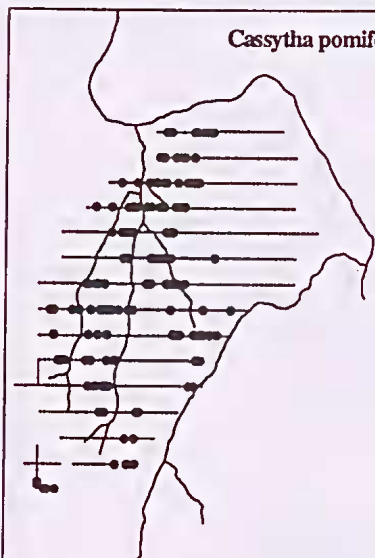
Hypoxis occidentalis



Hemigenia incana



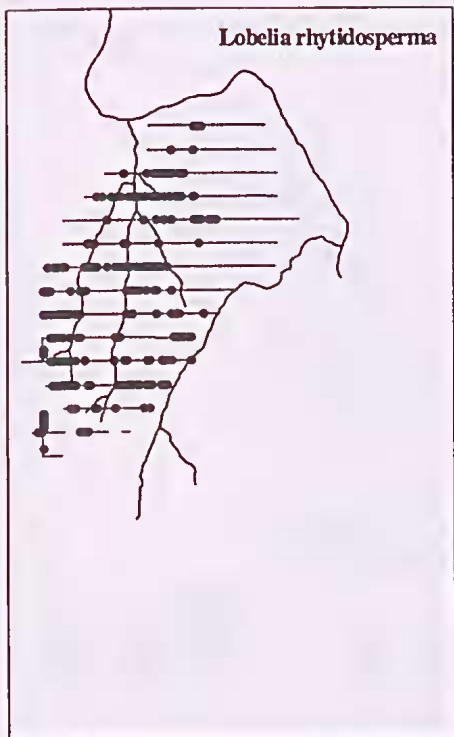
Cassytha pomiformis



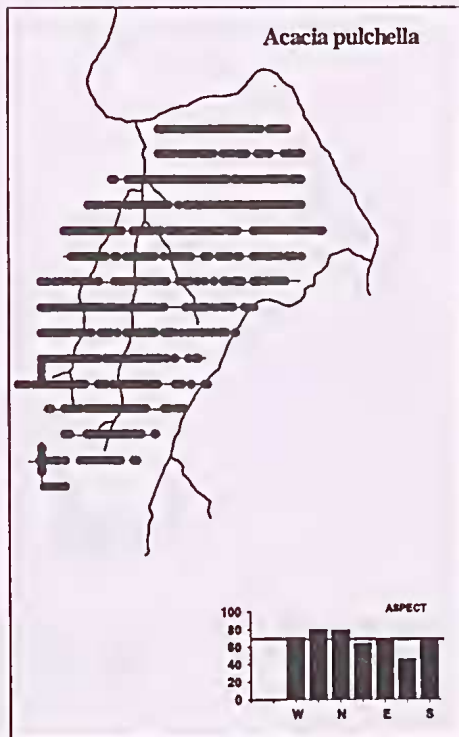
Isotoma hypocrateriformis



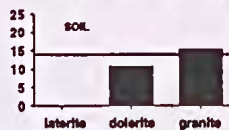
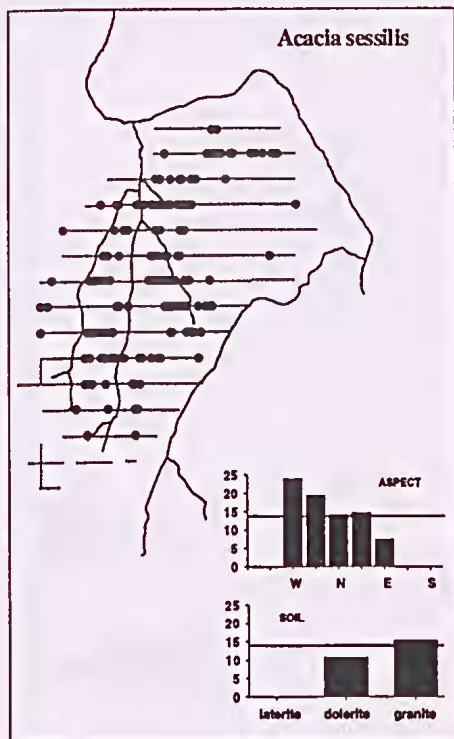
Lobelia rhytidospema



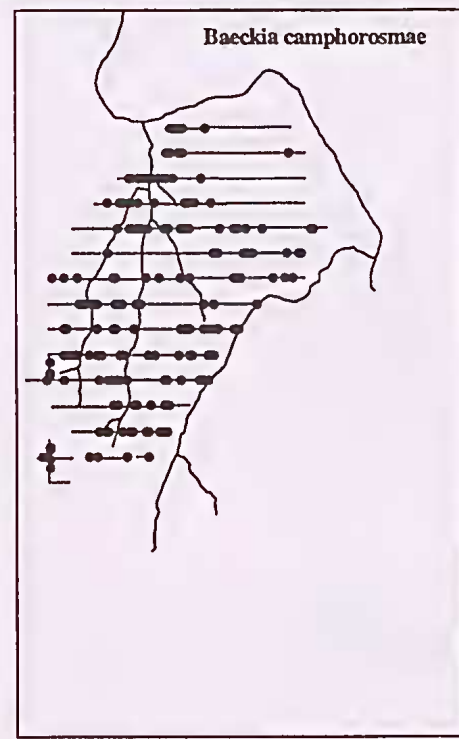
Acacia pulchella

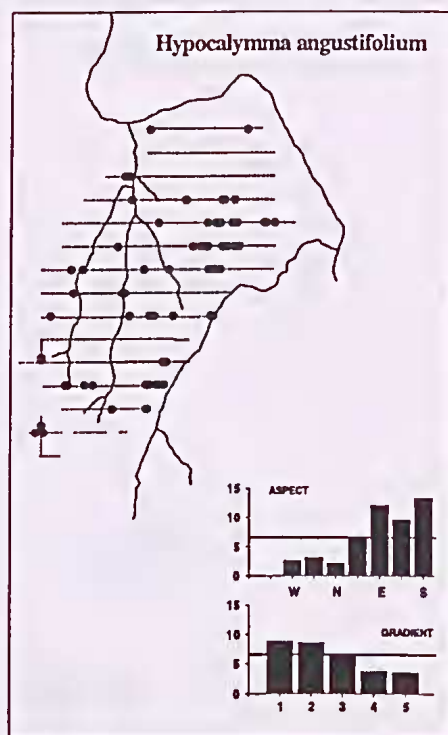
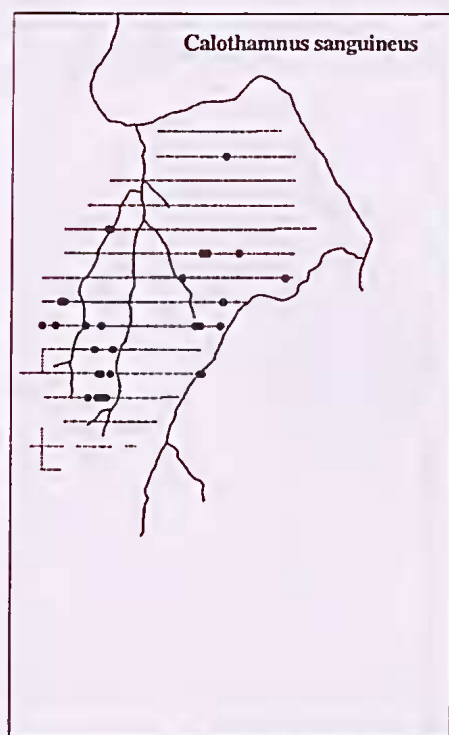
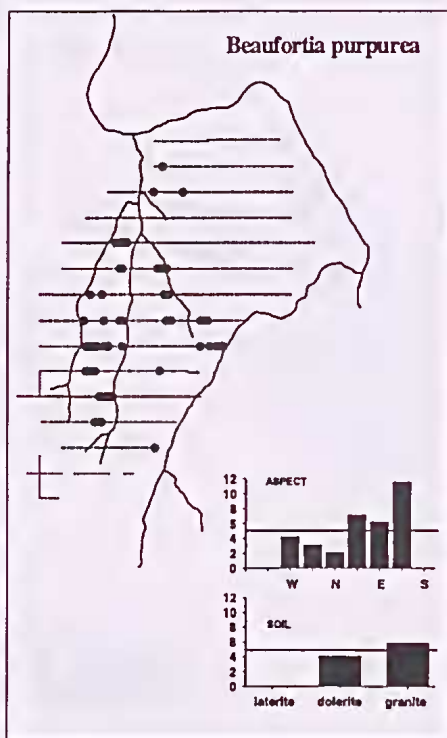


Acacia sessilis



Baeckia camphorosmae

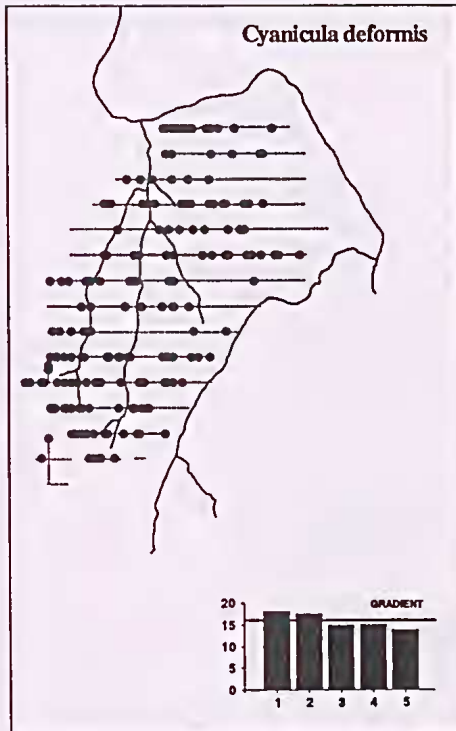




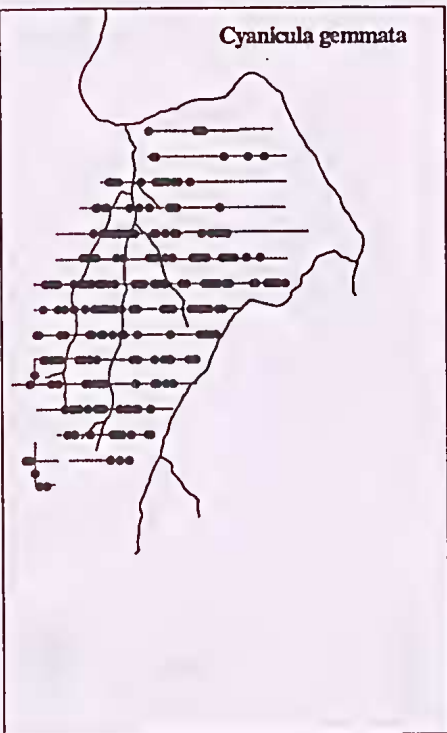
Melaleuca scabra



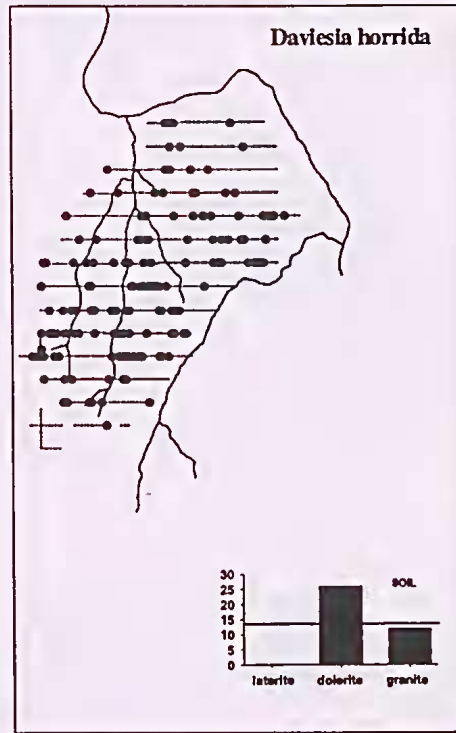
Cyanicula deformis

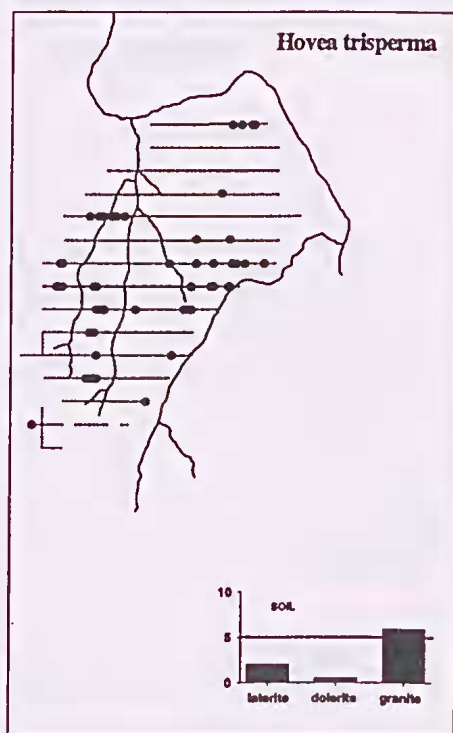
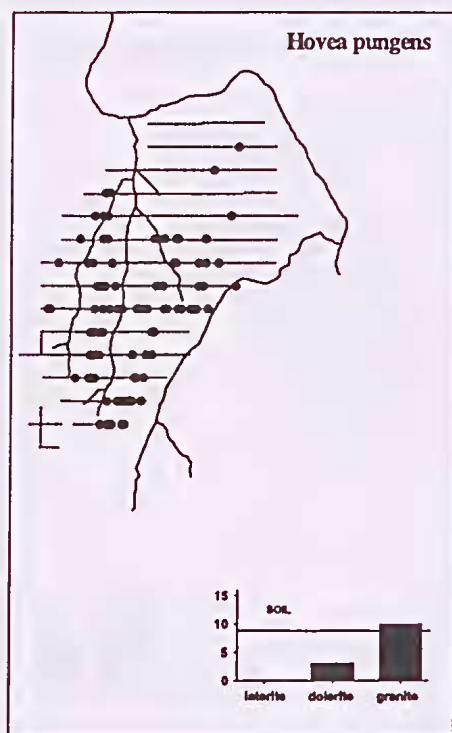
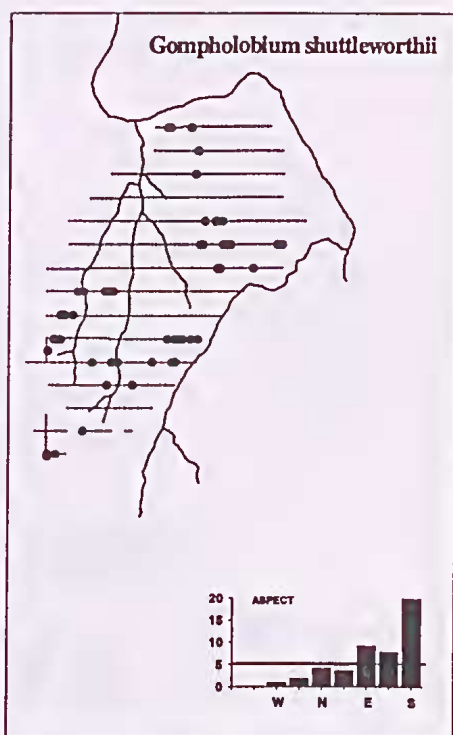
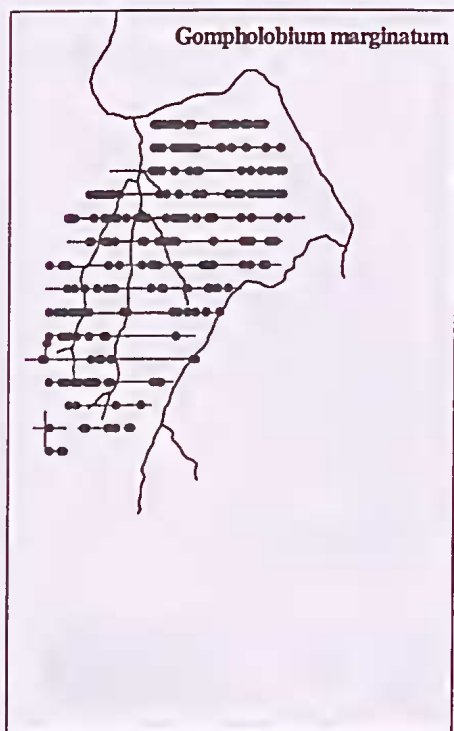


Cyanicula gemmata

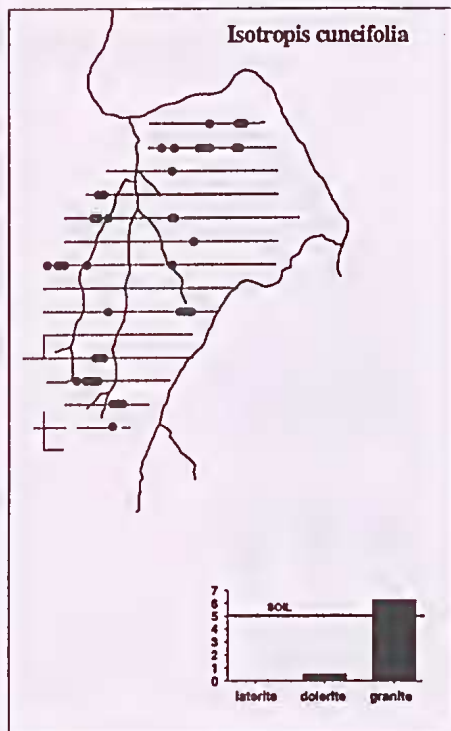


Daviesia horrida

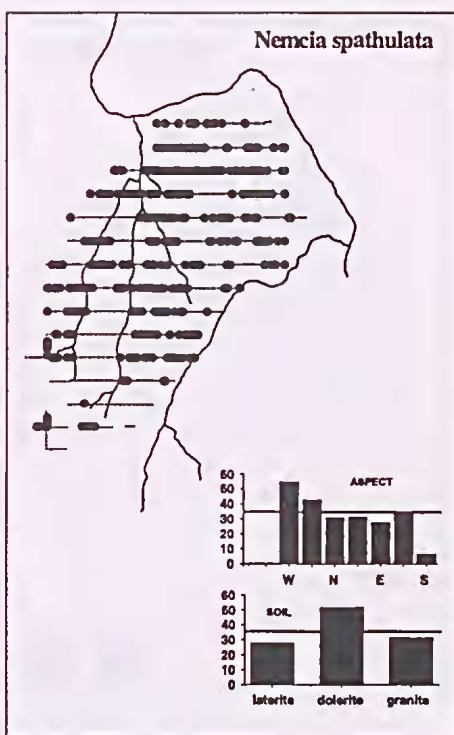




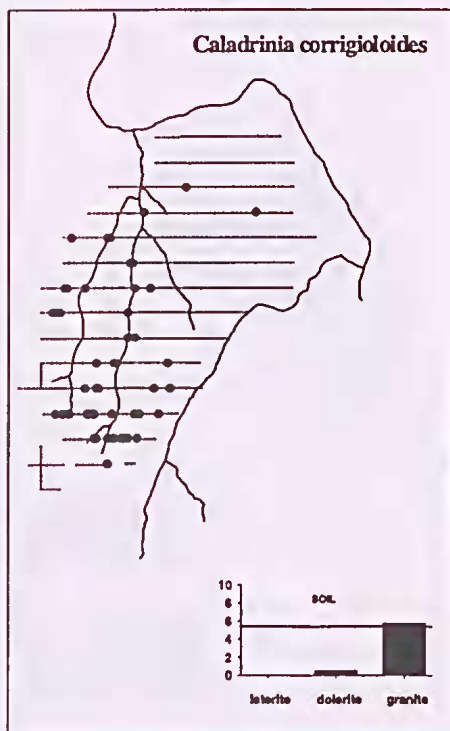
Isotropis cuneifolia



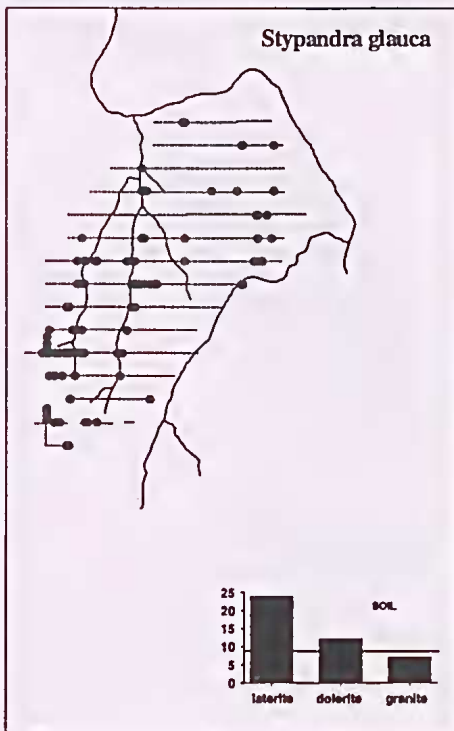
Nemcia spathulata



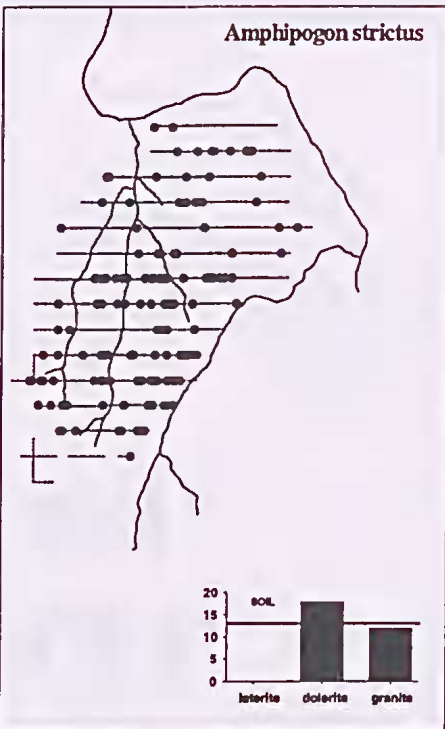
Caladrinia corrigioloides



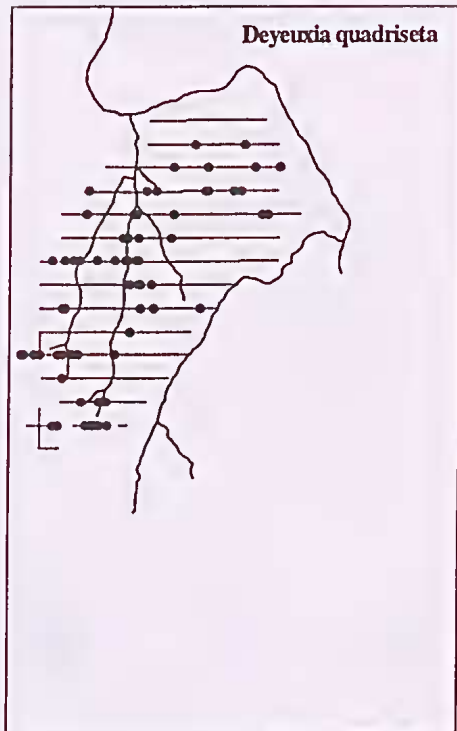
Stypandra glauca



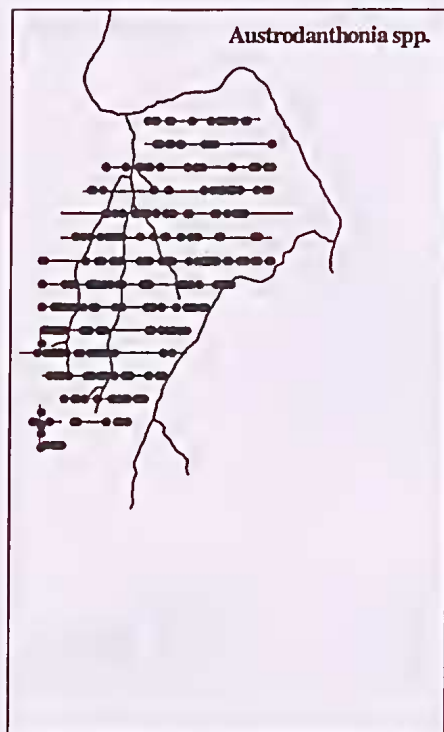
Amphipogon strictus



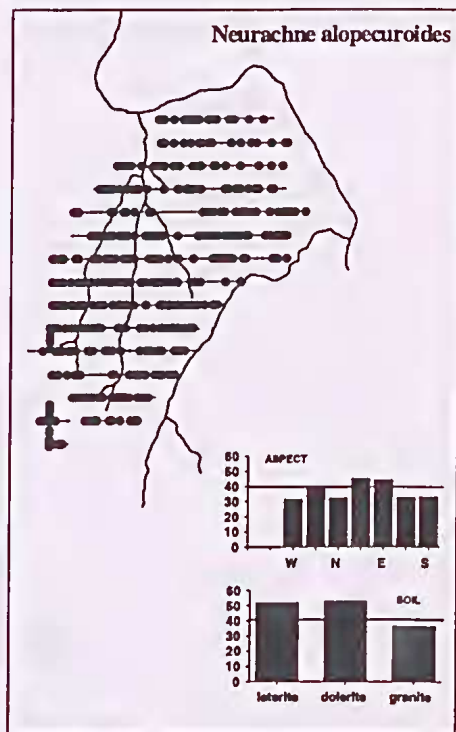
Deyeuxia quadriseta



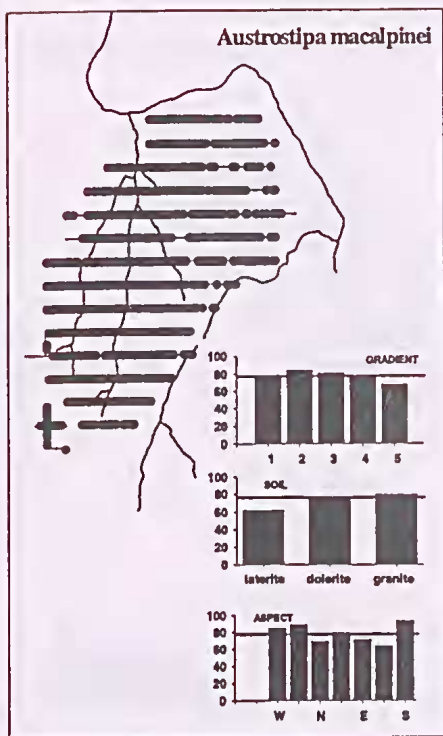
Austrodanthonia spp.



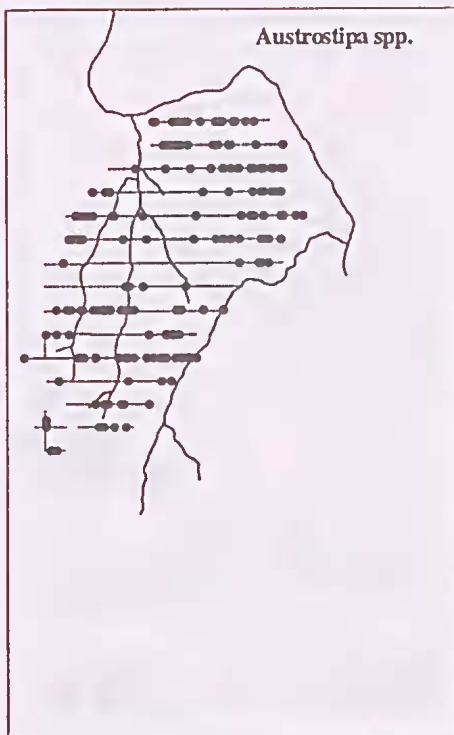
Neurachne alopecuroides



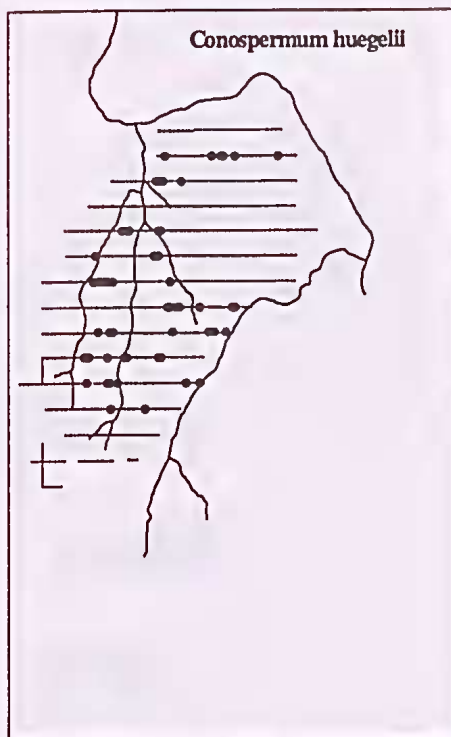
Austrostipa macalpinei



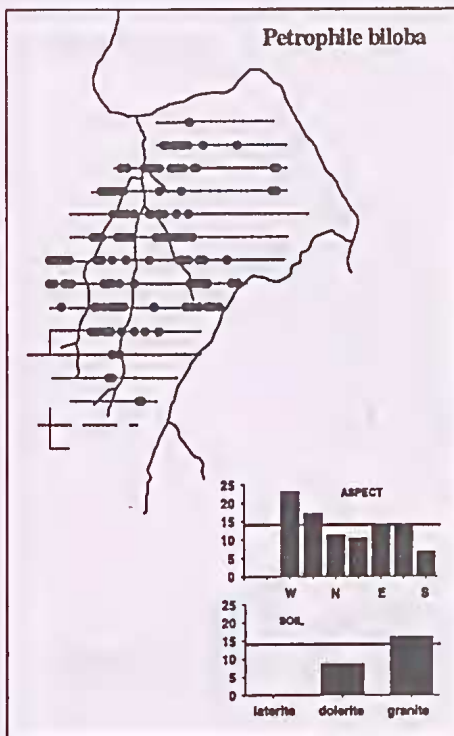
Austrostipa spp.



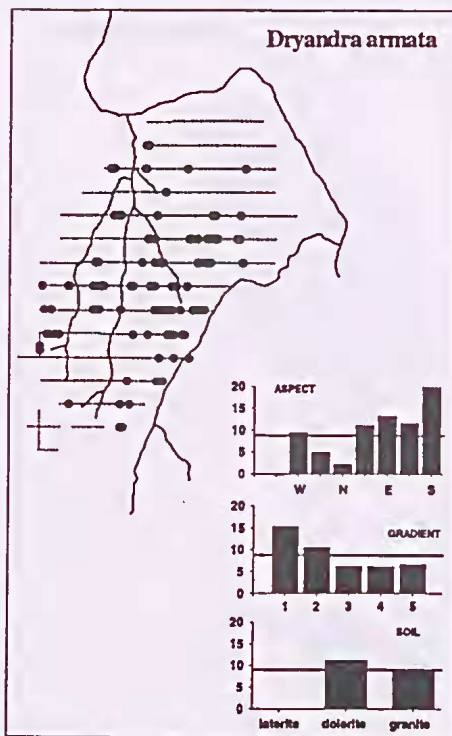
Conospermum huegelii



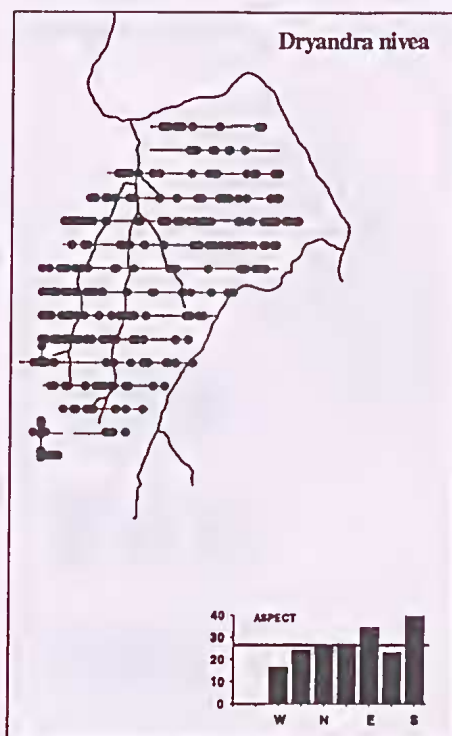
Petrophile biloba



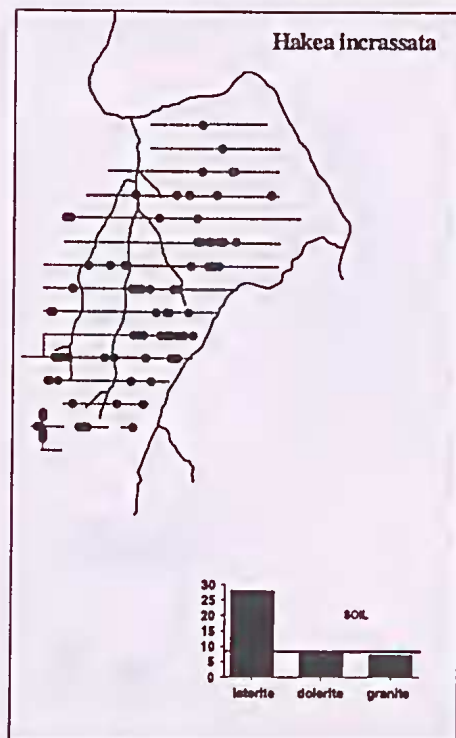
Dryandra armata



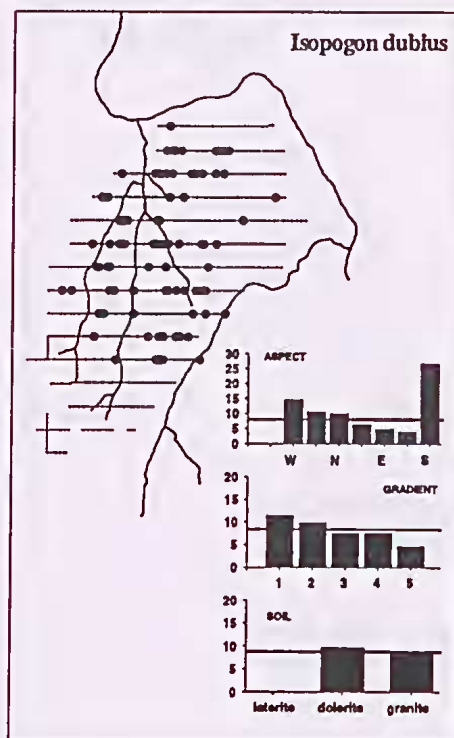
Dryandra nivea



Hakea incrassata



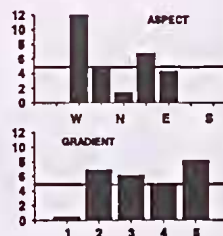
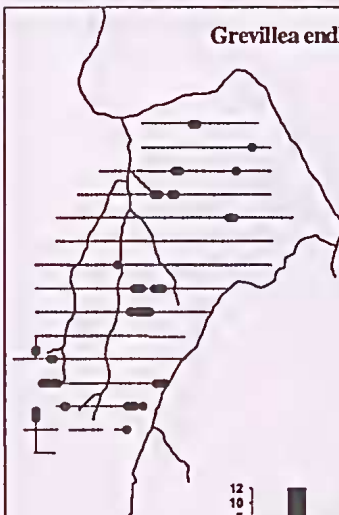
Isopogon dubius



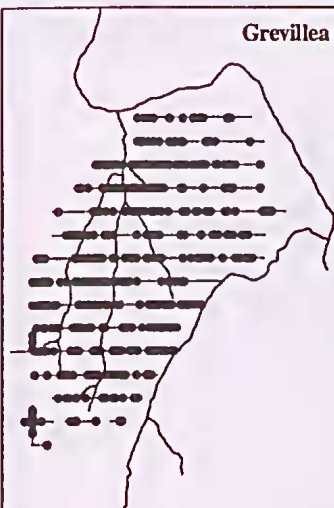
Grevillea bipinnatifida



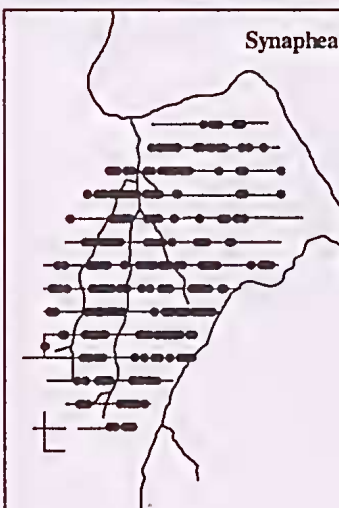
Grevillea endlicherana



Grevillea pilulifera



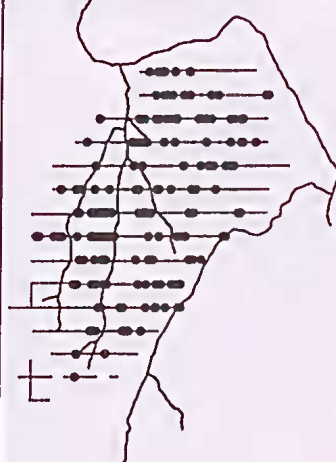
Synaphea acutiloba



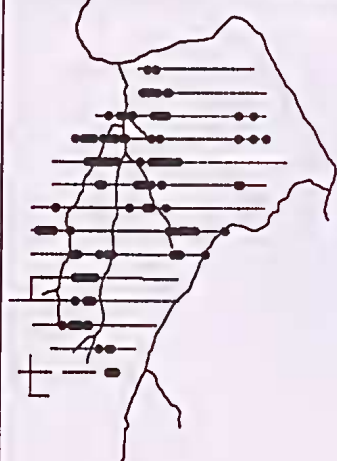
Hakea lissocarpa



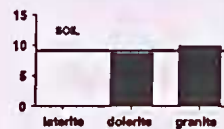
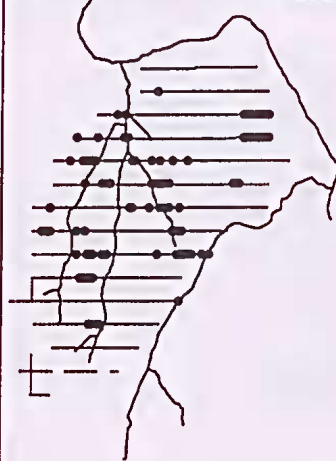
Hakea erinacea



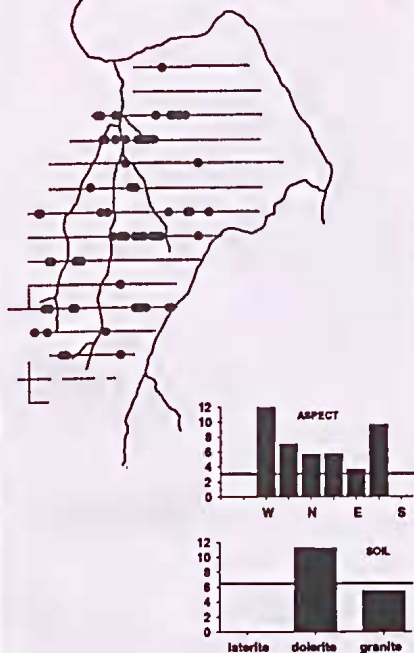
Hakea trifurcata



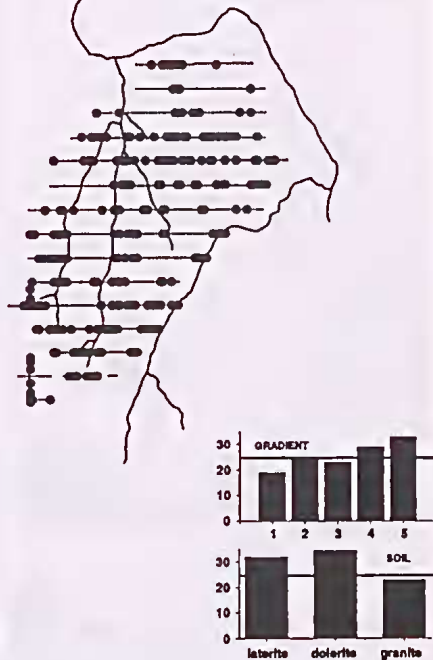
Hakea undulata



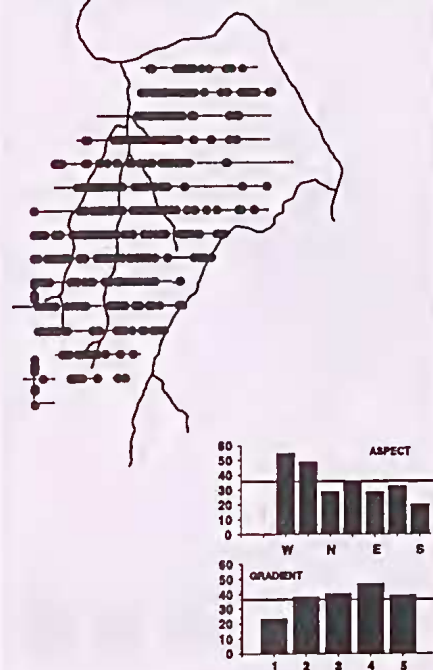
Lepidobolus preissianus



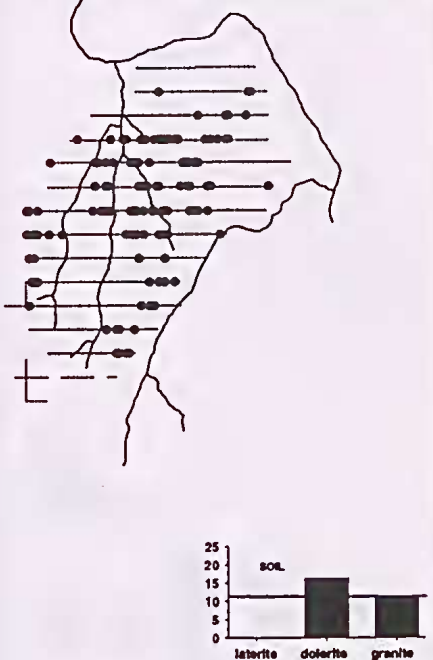
Desmocladius sp.

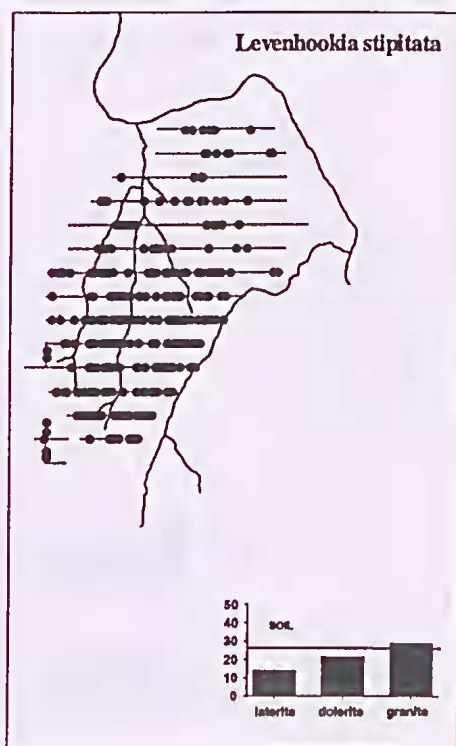
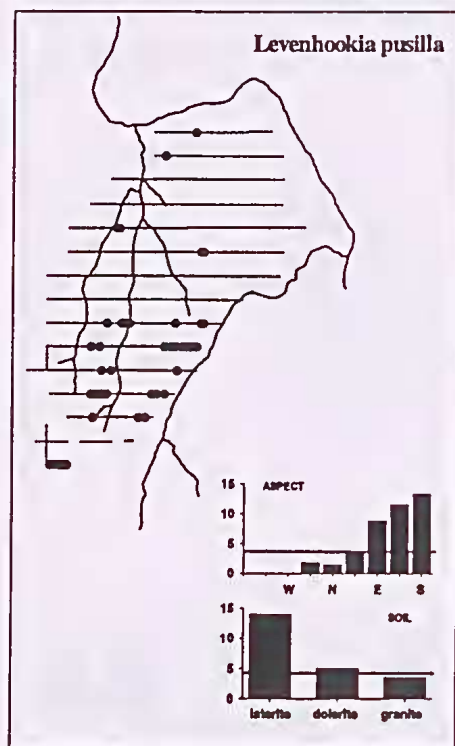
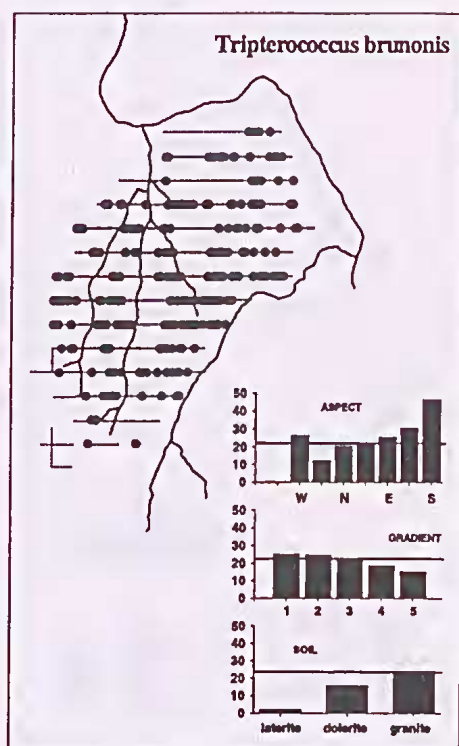
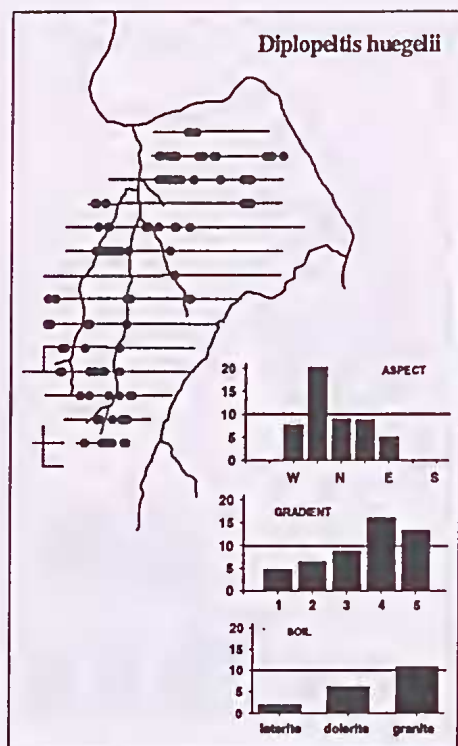


Trymallium ledifolium

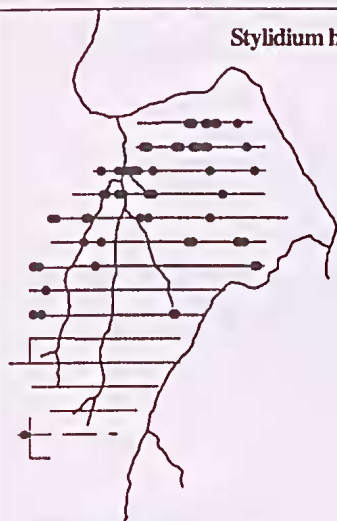


Opercularia vaginata

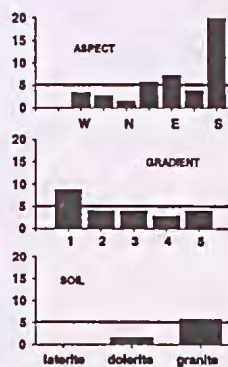
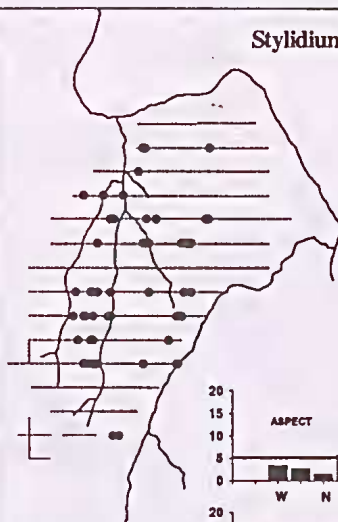




Stylidium hispidum



Stylidium repens



Stylidium brunonianum



Stylidium bulbiferum



